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ABSTRACT

This publication is designed to assist teacher librarians or those who are in charge of school libraries in the following areas: (1) online information services; (2) electronic bulletin boards and electronic mail; (3) CD-ROM and videodisc; (4) hypertext and hypermedia; (5) automated library systems; and (6) developing an IT plan for a school library. Also included are a discussion of the role of the teacher librarian, an overview of information technology, an explanation of curriculum resources information systems and guidelines for planning library automation, an overview of new and forthcoming technologies, and an IT plan for a school library. Three appendices provide a directory of sources and services, an extensive bibliography, and guidelines for planning for the introduction of online services in the school. (MAB)

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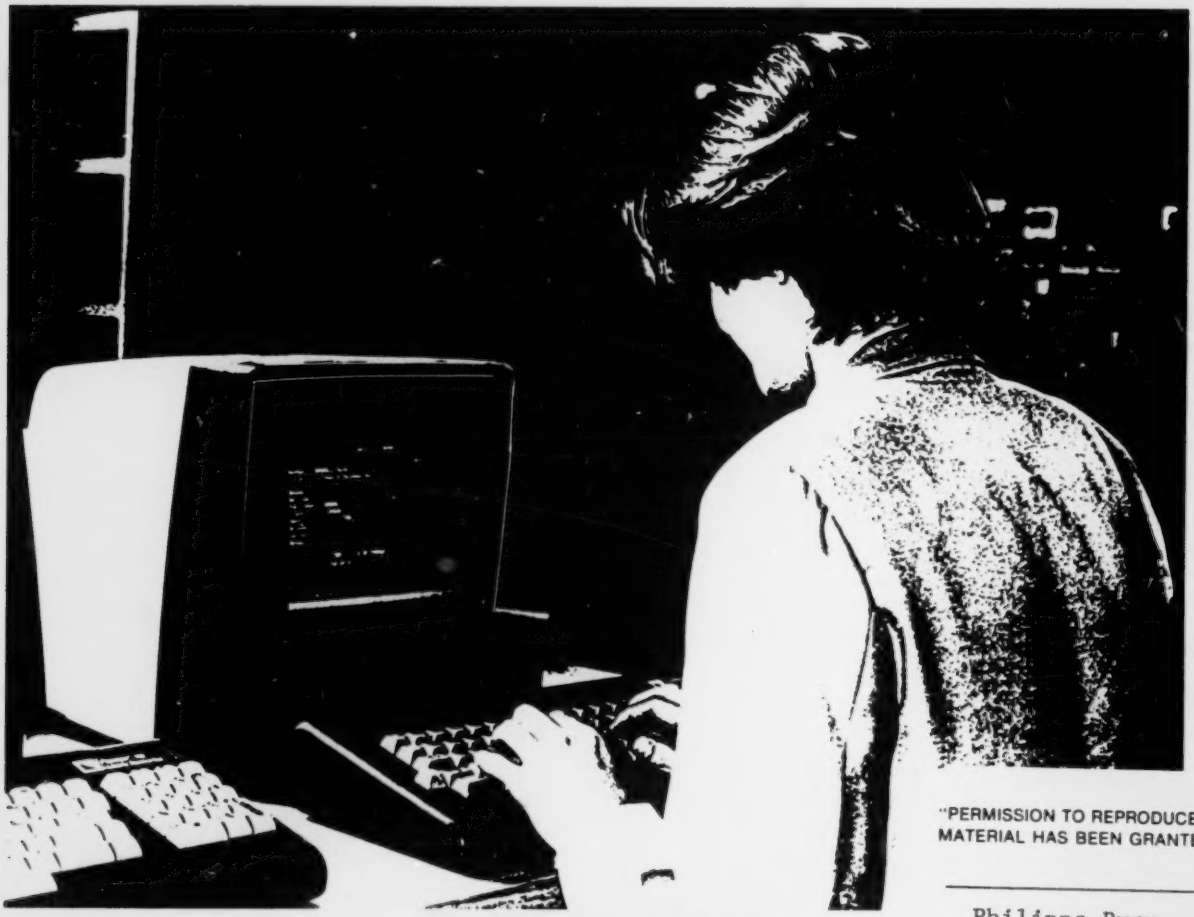
INFORMATION TECHNOLOGY IN SCHOOLS

Implications for Teacher Librarians



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AUSTRALIAN LIBRARY AND INFORMATION ASSOCIATION

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INFORMATION TECHNOLOGY IN SCHOOLS

IMPLICATIONS FOR TEACHER LIBRARIANS

Second Report of the
Online Information Services for Schools Sub-Committee

School Libraries Section (WA Group)
Australian Library and Information Association
Perth, 1990

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PREFACE

Through his writing and speeches in the early 1980s, Barry Jones made Australians aware of "the information society", and highlighted the implications of this concept. By the mid-1980s, it was widely recognised that the amount of information available through computer-based information services was growing rapidly, while access to online information services was becoming more and more critical for people in a range of professions or in business. It had become clear that computers were going to play an important part in information retrieval in schools, and also in the teaching of information skills. The development of ASCIS (Australian Schools Catalogue Information Service), the national online curriculum information service for schools and school libraries, provided some incentive for schools to consider "going online" for current information. The availability of relatively cheap general-interest online services, like *Viatel* (now called *Discovery),* further encouraged some schools to introduce students to online searching for information.

In 1986, the School Libraries Section (WA Group) of the Australian Library and Information Association set up a sub-committee to investigate and report on online information services and their present and potential use in schools. With such an unwieldly basis for a name, an acronym was called for, and so the "OLISS Sub-Committee" came into existence. For almost two years, this Perth-based group carried out basic research and investigated a range of online information services, with the emphasis on those that would be of use in the school library setting. In 1987, the Sub-Committee's report, *Online Information Services for Schools: Implications for School Libraries,* was published as a book by the School Libraries Section in association with the Western Australian College of Advanced Education (WACAE). The first printing sold out almost immediately; a second printing was sold within a year. The book achieved international circulation, with copies being purchased from the United States of America, Canada, the United Kingdom, and various European countries. However, despite continued demand, the School Libraries Section decided not to republish in 1988, on the grounds that changes in education and in technology since mid-1987 had rendered some of the material in the publication out-of-date; indeed, the School Libraries Section felt that the whole approach needed updating in the light of the changes going on.

As a result, in June 1989, the School Libraries Section (WA Group) revived the OLISS Sub-Committee, to look at the possibility of either revising the 1987 book, or producing a completely new publication. At its first meeting, on 17 August 1989, the new Sub-Committee decided to work towards a completely new publication, covering information access technology in school libraries (including online information services, electronic bulletin boards and electronic mail, CD-ROM and other optical storage media, hypertext and hypermedia, and automated library systems). In addition, it was decided that there should be chapters on the role of the teacher librarian in relation to information technology and information access within the school, and the development of an IT plan for the school library, along with appendices which would provide more detailed information about specific resources.

The range of information access technologies which were considered for the book, and which feature in its pages, highlight the changes since 1987. Online information services, electronic mail, electronic bulletin boards, CD-ROM and other optical storage media like videodisc, hypertext, and automated library systems, are already being used in some schools around Australia. More than eight hundred schools, for instance, are using electronic mail facilities, for communication with education authorities, for staff

professional development, and for curriculum applications. The "Computer Pals Across the World" international electronic mail project has provided a means for thousands of school children to take part in electronic mail activities within the context of the language arts curriculum. Some schools, particularly in Tasmania and South Australia, are going online to the Australian Associated Press current news database to collect up-to-date information for classroom activities or to create their own newsletters. CD-ROM players have been purchased by some schools and school libraries, with disks like *The Electronic Encyclopedia* being very popular because of the ease with which they can be searched. Other information technologies, like hypertext and hypermedia, are also discussed in chapters of this book, along with the more familiar automated school library systems.

With all these new developments, the OLISS Sub-Committee wanted to avoid the temptation to produce a book that was just a compendium of new technologies. Consequently, the educational and school management implications of each technology have received some attention. In addition, there are chapters dealing with the role of the teacher librarian in relation to information technology, and the development of an information technology plan within the context of the school. It is hoped that these chapters will help schools to plan for the implementation of information technology within a school-wide context, and to take advantage of what technology has to offer, while minimising the problems and difficulties.

Membership of the revived OLISS Sub-Committee has comprised people from state and independent schools in Perth, from the Western Australian Ministry of Education, and from the Western Australian College of Advanced Education (which offers courses for teacher librarians). The members were as follows:

- Ms Robyn Boyd, Teacher Librarian, Mel Maria School, Perth;
- Dr Anne Clyde, Senior Lecturer, Department of Library and Information Studies, Western Australian College of Advanced Education, Perth;
- Ms Imogen Garner, at the time of writing, Co-ordinator, Curriculum Materials Information Services, Western Australian Ministry of Education, Perth, and now Associate Librarian, User Services, University of Western Australia;
- Ms Linley Kemeny, at the time of writing, A/Consultant, School Curriculum Information Management, Western Australian Ministry of Education, Perth, and now Co-ordinator, Curriculum Materials Information Services, Western Australian Ministry of Education, Perth;
- Ms Sandra Naude, Senior Librarian, St Hilda's Anglican School for Girls, Perth;
- Ms Margaret Phillips, Teacher Librarian, Wanneroo Senior High School, Perth.

To support the work undertaken for this book, the School Libraries Section (WA Group) will conduct a range of activities for local teacher librarians, and others, related to the topic coverage of this second OLISS Report. For instance, a seminar on CD-ROM for school libraries was held in June 1990, while, at the time of writing, planning is proceeding for a session at the Australian Library and Information Association's national biennial conference in Perth, on "School Libraries and Technology". We hope that this initiative will result in further work on the applications of newer technologies to library and information services and access to information in schools. We also hope that people in other Australian states and territories will be willing to plan research, activities, and publications which draw on the work of the OLISS Sub-Committee and extend it in new ways.

Further copies of this book can be purchased from the Treasurer, School Libraries Section, Australian Library and Information Association, Technology Park, 2 Brodie Hall Drive, Bentley, WA 6102.

CHAPTER ONE

THE ROLE OF THE TEACHER LIBRARIAN: TOWARDS A FOCUS ON INFORMATION

INTRODUCTION

For the past decade or more, teacher librarians have increasingly shifted the emphasis of their role from resource management to a teaching role based on information skills instruction, promoting children's literature, and working co-operatively with teachers. Although this educational role has been strongly promoted by teacher librarians in Australia and overseas, support by teachers has been limited. Now the wheel has turned again and significant external trends, linked to industry restructuring, will have an impact on the education scene and on the role of the teacher librarian. Schools in the future will be even more complex organisations than at present and the management of vast quantities of information will present organisational challenges for the school administration. Schools, like all large organisations, will need to develop strategies to ensure that information is handled efficiently and effectively. It will require a clearly-defined plan to co-ordinate the management of records, data, and curriculum information. The teacher librarian has a role in this planning and implementation process.

IMPLICATIONS OF ECONOMIC RESTRUCTURING FOR SCHOOLS

Substantial changes have taken place over the past decade within the Australian economy. Economic growth has slowed and major industry restructuring has become a matter of urgency. This need to restructure is coupled with the need for effective and efficient administration of resources.

Within education, these economic trends have been translated into restructuring the large central bureaucracies. This is reflected in the move by the state governments to devolve the decision-making processes to the school level, and to give schools control over their management, including funding, staffing, and the allocation of resources to meet the needs of the local school community. The move is towards the establishment of school-based decision-making groups to include members of the school community. In this way, it is intended that schools become more accountable to the central office and the local community.

Restructuring will challenge the established role of the teacher librarian. Flexibility in the use of resources, including staff, time, funding, facilities, and materials, will be examined to produce the most efficient models for the operation of the school library to meet school needs. Uniformity in school library services will be replaced by more varied resourcing combinations, depending on local community needs.

CURRENT ROLE OF THE TEACHER LIBRARIAN

The role of the teacher librarian can be divided into two components: an educational role concerned with teaching students information skills and promoting children's literature, and a management or administrative role concerned with the operations of the school library.

Educational Role

Teaching information skills and promoting literature are significant educational activities for the teacher librarian. Information skills are essential life skills for students preparing for the world of work. Increasingly, these skills have been identified as skills applicable across the curriculum, and have become embedded in the syllabus documents of the subject areas. Although educational training institutions have been accused of being slow to recognise that student teachers in all disciplines need to be able to teach information skills, increasingly the emphasis for responsibility is moving from the teacher librarian to all teachers. The teacher librarian will, however, continue to co-ordinate skills across the curriculum and have a direct teaching role in the information retrieval component of this learning process.

The promotion of reading children's literature is a significant part of the teacher's role and is ably supported by the teacher librarian. This will continue to be the case with all teachers being required to take responsibility for improving student literacy.

Management Role

The provision of resources and curriculum information to support the school curriculum are essential activities for the teacher librarian. As the needs of the client groups - teachers, administrators, students, and community users - increase, the pressure for sophisticated management systems will lead to the adoption of technology for both education and management purposes. The increased demand for school library automation, online services, networking with other information providers, is the manifestation of this pressure on the school library to meet the curriculum needs of the school organisation.

INFORMATION TECHNOLOGY

Information technology in the school library has the potential to support both the educational and the management roles to be performed by the teacher librarian. For some years, this potential has been recognised, and it has been argued that "no other department in the school can demonstrate as many examples of information technology in action as the school library". (*Online Information Services for Schools,* 1987, p.9) Although the potential has been stated, it appears that, in reality, teacher librarians have been slow to operationalise this potential. The use of online sources of information, including databases, bulletin boards, and electronic mail, is not widespread in the school library community. To date, only a minority of school libraries have automated their manual systems, although sound educational and management arguments support the move to automation of school libraries. The use of a good automated catalogue enables students to develop essential information retrieval skills within a meaningful context as the need arises. Access to the information available in the school library is also greatly enhanced. Microcomputers are to be found in some school libraries to assist in management tasks and to support educational software. However, it could not be stated that access to this hardware is widespread in school libraries at this time. CD-ROM technology offers the potential to access vast quantities of curriculum information by school libraries. However, provision of relevant school information on CD-ROM is only now becoming available. The falling cost of players, coupled with an increased range of relevant disks, may be the catalyst that pushes the school library into the information technology age.

EMERGENCE OF INFORMATION MANAGEMENT

The philosophy of self-determining schools has increased the need for relevant information management within the school. The use of technology to manage the

administrative records and files has already been identified as essential for the successful achievement of the school's goals, and computerised administrative systems for timetabling and school records, have been installed in many Australian schools.

The importance of curriculum information at the school level is also of increasing significance, and will have an impact directly on the teacher librarian. The relationship between the centrally-produced syllabuses and the school's increasing flexibility to determine the curriculum to meet local needs will place increasing pressure on the provision of up-to-date, relevant curriculum information. Curriculum information resources management will include, not just resources held in the school library, but all curriculum materials held in the school to support the school curriculum. The specialised skills in selection, cataloguing, and indexing and retrieval, relevant to all teacher librarians, will be invaluable in the management of these curriculum resources. The teacher librarian will be able to extend these resources by accessing external sources as well.

Linkages must be identified between the information subsets. Administrative information and curriculum information overlap, and the skills of the teacher librarian in information management will be required to establish networks to support the flow of information around the school and to and from the external environment.

FUTURE DIRECTIONS

The management of information in a school is becoming an increasingly complex undertaking. Few staff have the training and the skills to manage information effectively. Teacher librarians have the opportunity to assume a significant role in the new organisational structures of the school.

The need for effective management of information is not new, but the growth of school organisations and the impact of computers and telecommunications technologies on them have made the planned management of information possible and essential.

The impact of this technology on school organisational structures will open up a host of new opportunities. School libraries, as curriculum information centres, can support these developments. The need is for teacher librarians to broaden the boundaries of their services and provide their unique skills to school administrators. This includes the identification of information resources from both internal and external sources. Teacher librarians will need a sound understanding of technology, covering methods of inputting, storing, retrieving, and distributing information on both a local and a remote basis. An understanding of management, involving strategic planning, information systems, human resources, interpersonal communications, budgetting, and marketing, will also be essential for the role of curriculum information manager in the school.

CHAPTER TWO

AN OVERVIEW OF INFORMATION TECHNOLOGY APPLICATIONS

INTRODUCTION

For teacher librarians to successfully perform the duties of curriculum information manager in a school, they need to be at the leading edge of information technology applications, and recognise appropriate applications to support educational programmes in the school. This requires teacher librarians to be well informed and critical evaluators of current information technologies, including appropriate online information services, CD-ROM, hypertext, and library automation.

Teacher librarians must extend their information skills programmes to include the additional skills required by client groups to use the information technology effectively.

As curriculum resource providers, teacher librarians must plan for the acquisition and use of information technologies such as online information services and CD-ROM, and ensure that information technology is integrated into the collection development programme established by the library and teaching staff.

INFORMATION TECHNOLOGY

So what is information technology? An important concept (and an important piece of jargon) to emerge in recent years is that of "information technology" or "IT". This term has been coined to describe the technology that has emerged from the integration of the previously separate technologies of:

- computers, including microcomputers, word processors, and large mainframe computers;
- communications technology, including the telephone, satellite communications, video and computer communications, facsimile transmission (fax), and the field of fibre optics;
- microelectronics - the increasing miniaturisation of electronic control functions in equipment of all sorts;
- data storage technologies, from the older computer tapes and floppy disks, to newer optical storage media such as CD-ROM;
- technologies related to robotics, artificial intelligence, hypertext, voice recognition, artificial vision, and scanning.

Computers become much more useful, and much more powerful, if they are connected to each other via telephone networks, so that information stored on one computer is available to people in other places. Computers can also be connected to devices controlled by microelectronics, such as CAT scanners, robots, and cameras, to collect and process data or perform certain tasks. The information processed by the computer and/or transmitted via communications networks can be in the form of words or text,

numbers, pictures, video, temperature or pressure readings, computer programs, voice or other sound, and so on. In fact, the form in which the information is presented can be changed through the computer, where suitable facilities are available: musical notation can be scanned into the computer and presented as sound; text can be entered from the keyboard or through a scanner and presented as Braille; numeric data can be presented in graphic form. The idea of information technology is important for libraries, which are concerned with the storage, retrieval, evaluation, and use of information, whether that information is contained in the library collection or is located in a remote site, or on a remote computer. In fact, modern information technology has the potential to bring the library staff and users into contact with all the information they need, no matter where it is stored or where it was generated. The barriers tend to be barriers related to management, finance, language, and knowledge of what is available, rather than technological barriers.

Computers and other forms of information technology are becoming a basic part of our social structures, organisations, and institutions. Information technology has a place in farming, education, public transport, medicine, conveyancing, mail sorting, air traffic control, monitoring tax returns, in fact, in most areas of our lives, whether we are conscious of this or not. However, the increasing use of information technology in our society has brought with it problems as well as benefits. The introduction of computers into the workplace has resulted in employment restructuring as well as increased efficiency. While employment opportunities have opened up in newer, "high-tech" sectors and in the information sector, jobs in more traditional areas have decreased. The problem of worker shortages in some areas and unemployment in others cannot be solved simply by "reskilling" the unemployed. Again, increasing use of electronic funds transfer (EFTPOS) and online banking have meant that financial transactions are processed more rapidly and major purchases can be made outside normal trading hours. But it also poses a threat to privacy, with details of each individual's financial transactions being stored on computers.

Basic to the idea of information technology is the computer. In most school libraries, this will be a microcomputer (or several microcomputers), a microcomputer network (with several microcomputers or terminals connected), or, perhaps, a small minicomputer with several terminals. The main hardware components of any computer are:

- the central processing unit or CPU (in a microcomputer, this is usually housed behind the keyboard or in the main "box"; in a minicomputer, in the main cabinet);
- a means, or several means, of putting information into the computer (at a basic level, a keyboard or a terminal, but other possible means include a "mouse", a barcode reader, a scanner for reading in text, numbers, or graphics);
- a means of getting information out of the computer (again, at a basic level, a VDU or video screen, or a printer, but sound output and other forms of output are also possible);
- a means of storing the information (a floppy disk, perhaps, on a microcomputer, or a hard disk).

In a school library, a modem (with communications software) might be used to link the computer to the telephone network; a barcode reader might be used to enter borrowing information into the computer or a terminal at the circulation desk; a CD-ROM player or "drive" might be linked to the computer to give people access to information on CD-ROM disks; and a wide range of different types of hardware might be linked to the computer to

support some hypertext or hypermedia applications. Operating system software and applications software will be needed to support all applications used in the library.

APPLICATION OF INFORMATION TECHNOLOGY IN SCHOOL LIBRARIES

Developments in information technology are expanding continually, as are the applications for school libraries. Examples that have emerged and will be considered in detail in this publication include online information services, electronic bulletin boards, electronic mail, optical disc media, hypertext, hypermedia, and library automation. It can be clearly illustrated that each of these applications support the role of teacher librarians.

A significant outcome of the application of information technology in the school is the change in the nature of the information available to the school population. There will be positive effects on the volume, sources, format, nature, and accessibility of the information. Students have access to resources located throughout the school through the use of library automation. Resources outside the school can be identified through online information services. Students may access the information itself, for example, through weather reports on a videotext service or through a search of an encyclopedia on CD-ROM; identify a source of information, for example, through abstracts on online information services or through a search on the school's library automation system; or contact a person who is a source of information, for example, through electronic mail or electronic bulletin boards. Presentation of the information, in ways that appeal to different senses, is becoming more common. Colour, full motion picture sequences, and stereo sound will become the norm through developments in hypermedia. Increased intellectual access to the information is a feature of these applications. CD-ROM, online information services, and library automation, can provide relatively sophisticated search facilities and hypermedia allows users to develop searches which reflect their own cognitive styles, rather than the linear constraints imposed by traditional computer- and print-based information sources.

A corollary to this changing nature of information as a result of applications of information technology (and the increasing amount of information available in many different formats) is the need for the development of effective information skills to ensure that the information requirements of the individual are met. Herein lies a responsibility for all teachers.

To optimise the potential of information technology applications in school libraries, teacher librarians will need to be knowledgeable about each application, its operation, sources of information about the application, selection criteria, and applications in the school. This knowledge should be the basis of the production of an information technology plan for the school library, within the context of the school plan.

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CHAPTER THREE

ONLINE INFORMATION SERVICES

INTRODUCTION

"A world of information at our fingertips" - this is what online information services can mean for schools. With a microcomputer, a modem, and a telephone, schools can tap new information sources and acquire new techniques for locating information.

Online information services, based on large central mainframe computers, have been with us for decades, serving a small audience of academics and professionals. However, with advances in microcomputer technology over the last ten years, online database services have "blossomed", and are being used by increasing numbers of people who rely on them as a means of locating information which would be impossible or too time-consuming to find manually. As the demand for these services increases, so the number and variety of online databases available grows. At present, there are more than six hundred online host organisations providing online access to more than four thousand individual databases around the world.

The earliest online information services were generally bibliographic; they either provided cataloguing information for libraries, or they consisted of references to books and journal articles from around the world, usually with abstracts. Once people had the citation and the abstract, then the item could be acquired in hard copy on inter-library loan. In recent times, however, the trend has been towards full-text databases that provide the desired information without the extra step of locating or ordering the material. Full-text databases contain the complete text of books, newspapers, dictionaries, encyclopaedias, parliamentary papers, legal judgements, as well as statistical and other information. Already, the amount of text available is staggering.

OVERVIEW OF ONLINE SERVICES

Online Information Services

There are several large information retrieval services, such as AUSINET, AUSTRALIS, and OZLINE in Australia, DIALOG and ORBIT in North America, DATA*STAR in the United Kingdom, and ESA/IRS in Europe, which make available a wide range of databases on a multitude of topics, aimed at different groups of users. These information retrieval services, or "hosts", co-ordinate the offering to online users of databases created by others. One of the largest of these utilities, DIALOG, has more than 250 different databases, while ORBIT has more than one hundred. In Australia, AUSINET hosts approximately twenty databases, while AUSTRALIS has over thirty. Most of these databases are purely bibliographic databases, which provide references to the literature available on a subject, with annotations. In addition to books, they usually list journal articles, reports, theses, and sometimes audiovisual materials.

Examples of bibliographic databases of particular relevance to schools include the *Australian Family and Society Abstracts, Leisure, Heritage Australia,* the *Australian Bibliography of Agriculture,* and *SAGE* (which gives a comprehensive coverage of articles in Australian science and geography periodicals) on AUSTRALIS; *Australian Education Index* and *APAIS* (Australian Public Affairs Information Service) on

AUSINET; and *ERIC* (Educational Resources Information Center), the major database in the field of education, on both ORBIT and DIALOG.

Despite the fact that bibliographic databases give references to books, articles, and other resources where information may be found, rather than the full text of the resource itself, they are still extremely useful. Some databases provide information that is not just bibliographic but also includes full-text, statistical, and graphic information of various kinds.

The Australian utility or host, AUSINET, has the full text of the *Australian Financial Review,* and factual or statistical databases on the system include *The Directory of Education Research and Researchers in Australia.* DIALOG, in addition to its bibliographic databases, has some full-text information services of particular relevance to schools, including online versions of *Facts on File, Academic American Encyclopedia,* and *Everyman's Encyclopedia.* These are more up-to-date than their more familiar print copy counterparts, and also easier to search, since all information related to a topic is shown, no matter in which volume it would appear in the print version.

Types of full-text information currently available online include the following.

- The full text of documents, books, journal articles (indeed, whole journals), newspaper articles, dictionaries, encyclopaedias, manuals, parliamentary papers, legal judgements, and research summaries.
- Abstracts of articles, books, conference papers, and research reports.
- Current and constantly-changing information, including news services, weather information, stock market reports, financial information.
- Statistics of various kinds, including information from the Bureau of Census and Statistics, and from other surveys, with appropriate software to manipulate the statistics.
- Graphic databases for searching chemical data by structure, substructure, generic structure, and chemical formulae; trade marks; and other information normally represented in graphic form.
- Communications facilities, including electronic bulletin boards, messaging services, online ordering, and information exchanges.

Applications of Online Information Services

The following will give an idea of some possible applications of online information services.

- Inter-Library Loans. Bibliographic databases can pinpoint material outside the user's own library which can be obtained through the inter-library loan system. Many senior school projects require access to specilised resources, which a school library could not afford to provide. The use of a remote bibliographic database covering the appropriate subject field, plus the inter-library loan system, gives school students a realistic illustration of the processes required to obtain information. As a result, they will understand the processes better, and appreciate the need to plan ahead, since the process does take time.
- Abstracts. The long abstracts provided by many of the bibliographic databases can be used as the basis for a review of the current literature, to determine likely

directions, and to pinpoint areas in which little has been written, as well as for information.

- Information Skills. The bibliographic databases can be used effectively to teach and reinforce online search skills in schools. Searches on them are often very quick, and because large numbers of inappropriate references can appear as a result of poor search techniques, it is easy to use them to illustrate the need to prepare a good search strategy before going online. Several of the online information service hosts, like ORBIT, provide a couple of hours of free access to new databases, to promote the database and to enable users to become familiar with it. Schools can take advantage of this free time to give students some search experience, especially if they are helped to prepare appropriate search strategies in advance.

- Analysis of Trends. At the senior school level, the search of a bibliographic database could be used to see what type of information exists on a topic, rather than to actually locate the books, articles, and reports themselves. A search on a database over a number of years would show, for instance, the growth of a new area or topic like "ergonomics" or "compact disks". Or it could be used to illustrate changing concerns and emphases over the years in the literature of a particular topic - pollution, for example, or environmental protection.

- Immediacy. Full text databases can be used in schools to gain access to information which is more up-to-date than that available in published sources, and to locate information more quickly than would be possible with a manual search of available sources.

- Search Strategies. Full text databases can be used to teach online information search strategies which are different from those required for using purely bibliographic databases. This will expand students' knowledge and experience of information retrieval.

- Extending the Information Environment. Full text databases can extend the information environment of administrators, teachers, and students in schools, by providing rapid access to information that is not yet available in print form, or is difficult to locate or search in print form. Some of the services on DIALOG and ORBIT, for instance, provide the full text of some current general and specialist journals to which the school may not be able to subscribe; further, they often provide this access well before the journal appears in printed form. Newspaper databases, such as the *Australian Associated Press* news service, or the PressCom service of *The Adelaide Advertiser*, provide fast and easy access to current information on a wide range of topics, for students and teachers.

Videotex Services

Videotex or viewdata services are similar to the online information retrieval services already discussed, in that they are computer-based and can be accessed using a microcomputer, a modem, and a telephone connection. In other ways, however, they are significantly different.

- The databases on a videotex service are arranged as a series of numbered frames or screens of information, which can be accessed by working through a sequence of menus. The online services, on the other hand, are accessed by typing a series of commands and search terms; and the output from a search comprises only that information actually requested. The search skills and

strategies required for using videotex and online services are therefore very different. Videotex services usually can be used very easily by people who are not accustomed to online searching, while the use of online services usually requires some training or experience.

- Videotex services use colour and graphics extensively in their screen displays, whereas neither can be used currently in other services.

- While videotex services can be accessed through the telephone by using a microcomputer, a modem (sometimes at 1200/75 baud rate), and communications software, as can online information services, videotex services can also be accessed using a telephone, a television set, and either a microcomputer with communications software, or a cheaper "dumb terminal" designed specifically for the purpose.

- Public videotex services, which normally allow users access within a country for the cost of a local call, are often cheaper to use than other online services, particularly in areas remote from capital cities where long-distance telecommunications costs can be high.

Prestel, Britain's pioneer public videotex service was the first in the field, providing a model for other services. In addition, it has led the way in educational applications, providing a range of services aimed at schools and colleges, and supporting this with research and publications.

Australia's first public videotex service, *Viatel,* operated by Telecom Australia, commenced operations in 1985; it was superceded by the *Discovery 40* service in late 1989. *Discovery* comprises both a conventional videotex service, *Discovery 40,* which is accessed using the 1200/75 baud rate of the old *Viatel;* and *Discovery 80,* which is a conventional online service which is accessed using the normal 1200/1200 baud rate of other online services. An example of an Australian private videotex service is *Elderlink,* used by some agricultural high schools.

Applications of Videotex Services

Educational applications of videotex services include the following.

- Using public information services on *Discovery* (and some other videotex services) including news, weather, financial information, and consumer services, as a source of current information for classroom and subject work, in the same way that print or audiovisual sources would be used.

- Helping students to develop appropriate information retrieval skills through the preparation, carrying out, and evaluation of searches.

- Using the information services as tools in teaching in a wide range of subject areas - for instance, using the travel information services in geography or mathematics (students calculate the shortest or cheapest way to go, work out arrival times, travel times, and so on), or using news services to create a school newsletter incorporating local news.

- Using the telefax and electronic mail facility to send messages to other schools to enable work on joint projects such as comparative environmental studies.

Simulations are available, for example, *Edfax, Eco-net,* and *Communitel,* which allow schools to create small local videotex services on their microcomputers. Most of these

simulations allow users to download and incorporate frames from videotex services onto their own school databases, and to create frames of their own. This has advantages for information skills instruction, in that students not only search a database, but actually work on setting one up, and so became familiar with the way in which information is organised for retrieval on this particular medium. There are cost advantages, too, because, after frames have been downloaded from a videotex service, there are no external database search costs, and students can spend as much time as they need on searching.

EXAMPLES OF SERVICES

Since the the number of online information services and database hosts is so great, some of the ones that are most appropriate for schools have been selected and will be described in more detail.

ASCIS

ASCIS (Australian Schools Catalogue Information Service) is the national catalogue information service for Australian schools. Established in 1984, it currently provides cataloguing records to schools in the form of card sets, on microfiche, online, or on floppy disk. Users can dial up the database and search online. Online cataloguing services provide considerable benefits to libraries. They help to reduce cataloguing costs; they assist in the streamlining of cataloguing procedures; and they help to reduce the amount of time spent by librarians around the country on cataloguing - often cataloguing the same items. Thus professional library staff are freed for more productive activities. The use of ASCIS should result in higher cataloguing standards in school libraries, and hence better access to resources.

In the years since its inception, ASCIS has developed into more than a cataloguing utility. It now provides a range of review and evaluation services for educators, covering subject areas from computing to children's literature, and it also provides information on published and unpublished curriculum documents created by education authorities and individual schools around Australia.

- The Australian Curriculum Information Network (ACIN) database subset on ASCIS contains records related to all aspects of education, submitted by education authorities around Australia. Each record contains cataloguing information as well as an abstract that advises on the suitability of the items for different areas of study, the cost, availability of the item, and its usefulness as a teaching tool or as a resource for teachers or administrators.

- The NSCU Computer Software Review database subset provides information on commercially-produced educational software packages, covering subject content, hardware required, review information, and acquisitions information. Online searches for software reviews on the ASCIS database can be linked to other items on the database, so that a search for a particular software package could also result in the identification of manuals or other teaching materials for use with that package, or even reports on the use of that package in other schools.

- The Australian Studies database subset reviews curriculum resources about Australia which are suitable for teaching Australian Studies. Again, bibliographic, acquisition, and review information is provided.

- The Lu Rees Archives database subset of information on Australian children's literature is based on the holdings of the Lu Rees Archives of Australian

Children's Literature, housed in the Library at the University of Canberra. The records provide details of the Lu Rees holdings of information about authors and illustrators, manuscript, photographic, and audiovisual material available in the Archives on the authors and illustrators, information on their literary style, and details of awards won. This database subset complements the information provided in records related to the children's books themselves (bibliographic information and review information).

- The Aboriginal and Torres Strait Islander Resources Information Service database subset on ASCIS provides information on resources concerned with both contemporary and traditional aspects of Aboriginal and Torres Strait Islander life. Materials focus on such areas as history, folklore, culture, social life, art, literature, festivals, land rights, and the teaching of Aboriginal and Torres Strait Islander Studies.

- The Asian Studies database subset is currently being developed; it will provide information on resources related to all aspects of Asian Studies.

ABN

ABN (Australian Bibliographic Network) is a co-operative computer-based national cataloguing and bibliographic service. Users both add catalogue records online to the database in Canberra, and use records input by others where appropriate. In this way, a comprehensive national database has been developed which reduces the amount of time spent in original cataloguing around Australia. ABN also gives the locations in libraries around Australia for resources which are listed on the database; this provides the basis of a national inter-library loans network. ABN is available through the National Library of Australia.

ERIC

ERIC, the major online database in the field of education, is available on both DIALOG and ORBIT host services. The *ERIC* database is updated monthly, and contains over 680,000 records covering the period from 1966 to the present. The *ERIC* indexing and abstracting service covers published and unpublished documents and periodical literature related to all aspects of education, from the pre-school level to tertiary education, and associated disciplines. Areas of coverage include counselling and personnel services, careers education, early childhood education, educational management, exceptional children, languages and linguistics, teacher education, educational tests, measurement, and evaluation, social science and science education, libraries and their role in education. Acquisition information is provided where possible, so that users can locate the documents; in addition, there is a back-up document supply service for documents that are indexed on *ERIC*.

SAGE

SAGE is a scientific and geographic database available on AUSTRALIS. It is specifically designed for schools (particularly for use with Years 6 to 12), and gives a comprehensive coverage of Australian general science and geographic journals, with bibliographic information and abstracts. The aim of *SAGE* is to provide school students with the means to find answers to assignment and general reference questions. Among the journals covered are *Australian Geographic, Australian Natural History, Australian Science Magazine, Ecos, Eyespy, Farm, Geo, Habitat Australia, Heritage Australia, Landscape Australia, New Scientist, Rural Research,* and *Wildlife Australia*. *SAGE* is also being made available on CD-ROM.

Discovery

Discovery 40, Telecom Australia's revamped public videotex service, replaced *Viatel* in late 1989. Because it is relatively cheap (it can be dialled as a local call from anywhere in Australia), and because it contains much general-interest information, it has been popular with schools which are seeking to "go online". Services available on *Discovery 40* include the following.

- Australian Associated Press News Report, a videotex news service which is updated regularly through output from the Australian Associated Press online service.
- Telebanking. Online banking services include information on interest rates, foreign exchange rates, lending information, and travel information.
- METEX. Weather information designed specifically for pilots.
- Electronic White Pages. This service offers online access to the national "white pages" database which forms the basis of the print versions of the nation's fifty-five or so telephone directories.
- Comp-U-Store. A teleshopping service with a stock of over 20,000 items.
- Telefax. A service which enables a fax to be sent from a microcomputer to any fax machine throughout the world.

Unfortunately, *Discovery* contains a considerable amount of "adult only" information which is unsuitable for school use.

SOURCES OF INFORMATION

Major sources of information on the online information services that are available include the national and international directories, such as the *Directory of Online Databases,* produced by Cuadra Associates in California, and the *Directory of Australian and New Zealand Databases,* produced by the Australian Database Development Association. Both of these are available online as well as in print form. Another major Australian publication, which is regularly updated, is *The Recipe Book Service of Online Searching,* which provides current information on Australian and international databases, and also basic access and search information for those databases. It is an almost indispensable tool for those in Australia who search more than one database or host on a regular basis.

Periodicals such as *Online* and *Online Review* are good sources of current information on the online information industry, and also of reviews of online information services of all types. A new American journal, *Online Searcher,* is devoted exclusively to the use of online information services in schools; it is the first specialist journal in this field, and is very readable. The journal literature is supported by the published proceedings of the major conferences - the international "Online Information" conferences held in London and New York (and other cities) each year under the sponsorship of Learned Information, and the now biennial "Information Online and on Disc" conferences in Australia (sponsored by Sections of the Australian Library and Information Association). In 1989, the first international "Databases in Schools" conference was held in Chicago, and this is to be an annual event; the proceedings are available on audiocassette.

For individual online information services, the main source of information will be the literature and the manuals produced by the database provider or the host organisation.

OPERATIONAL ASPECTS

There are many equipment options for online searching. One way that is commonly used in schools, involves the use of a microcomputer with communications software, plus a modem and telephone connection. Virtually any microcomputer can be used - and communications software is available for almost all types of microcomputer hardware. The comunications software enables the microcomputer to connect via the telephone with the large computers hosting the online services, and to send and receive messages and information. The modem is the piece of hardware which physically links the microcomputer to the telephone (the software enables the search process to go ahead).

It should be noted that modems which operate at only 300 baud are not very convenient for searching overseas databases, because they are very slow. A "baud rate" is a way of measuring the speed at which information is transmitted through the telephone lines from the microcomputer or terminal to the database and back again. Slow transmission rates mean higher telephone costs. Those who plan to use overseas services regularly should consider a modem and software that will allow them to receive information at 1200 baud as a minimum. A 1200/75 baud modem will be required for using many videotex services. Many of the modems currently on the market are capable of operating at several different baud rates, depending on the purpose.

It is not really necessary to have a printer linked to the computer. However, it is advisable, as it enables the user to print out a copy of the information as it is received, whether it is bibliographic information, the text of a document, or a page of information from a videotex service.

Access to a telephone outlet is necessary for online searching. While it is more convenient to have a direct outside telephone line for this purpose, it is possible to go through a switchboard if an outside line is not available. The main disadvantage of this is that a telephone line through the switchboard is likely to be tied up for considerable periods when searches are being done; in addition, these lines are vulnerable to interruptions in transmission.

Dialling a computer service is the same as dialling a human telephone subscriber - the various connections that take place across the city or the country or the world are transparent to the user; in other words, they happen without the user being aware of them. The user knows when a connection has been made, because the information appears on the computer screen. Once a link has been established between the microcomputer and the host computer of the online information service, the user enters a code and password to gain access to the system. The code and password will be supplied when a subscription is taken out to the online information service, as will detailed instructions for its use. These instructions should be studied carefully before any attempt is made to "go online".

The processes for going online to Australian and to overseas services are slightly different. For Australian services, it is possible to simply dial direct to the host computer, and enter the code and password when directed. This works well for those in the capital cities where the host computers holding the information services are located, but it results in high STD telephone charges for others. An alternative is to dial via AUSTPAC to the host computer; this will certainly be cheaper for people in non-metropolitan areas. AUSTPAC is Telecom Australia's Australia-wide packet-switched communications network, specially created to allow for cheap computer-to-computer transmission. Using AUSTPAC requires an additional password, which will be allocated by Telecom.

Going online to an overseas online information service requires the use of an international communications carrier - an external equivalent of AUSTPAC. For Australians, the international carrier is OTC Dialcom. As with AUSTPAC, a password is needed, and this, and the instructions for use of the system, are available from OTC (Overseas Telecommunications Commission). From OTC Dialcom, the Australian user may be linked directly to the number of the overseas online information service or utility, or the link may be made from OTC through a communications carrier in that country to the information service. However, usually the user will be unaware of this linkage; the only indication that it is happening will be the information appearing on the computer screen. Once the link has been established with the overseas service, the user code and password are entered in response to screen prompts (as for an Australian service), and the particular database required on the service is then specified.

Although these procedures and requirements sound complex and difficult, using online services is really simpler than it seems here. Once the planning has been done, and the manuals have been read, and a few demonstrations have been watched, the apparent confusion will resolve itself.

SELECTION CRITERIA

In selecting online resources, the same criteria should be applied as would be applied in selecting any resources to support the school curriculum. In addition, some special criteria may apply; these could include the following.

- Recency and accuracy of the information offered on the service, and evidence of any bias in treatment or in selection of material for inclusion (for instance, the presentation of the national viewpoint of one country, the use of terminology that does not have universal applicability).

- The ease of use and user friendliness of the service (the quality of the manuals, the provision of on-screen help, clearly-worded screen instructions, simple and easy-to-remember procedures).

- What other online services the library has chosen to access. It is very difficult to become a competent searcher on a wide range of different services, particularly if some of them are used infrequently.

- Whether or not it is necessary to attend a special course before the service can be used properly.

- The overall cost, including subscription, telecommunications charges, and any costs for time on the system.

- The availability of special rates, services, and facilities for schools.

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(1989), "The world alive: students forge into online searching", *Online Searcher*, 1, 3, Spring, 1, 12.

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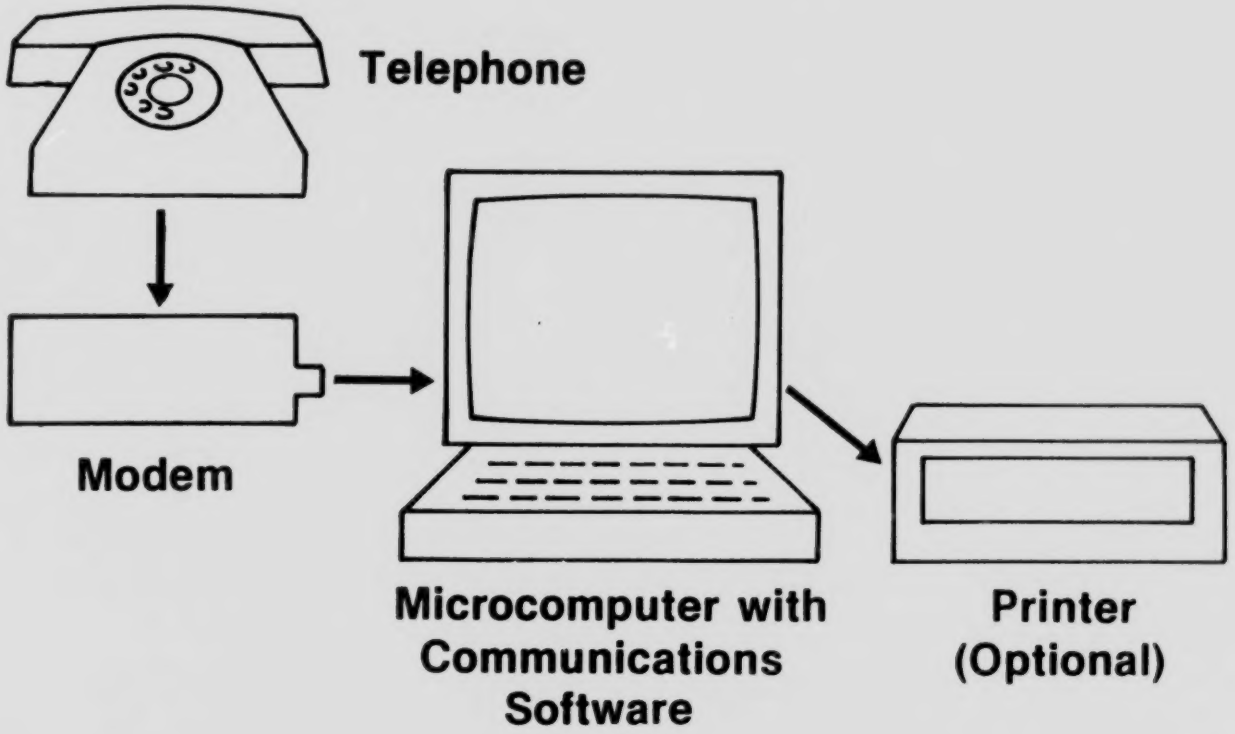
EQUIPMENT


Telephone
Modem
Microcomputer with Communications Software
Printer (Optional)

CHAPTER FOUR

ELECTRONIC BULLETIN BOARDS AND ELECTRONIC MAIL

INTRODUCTION

Electronic bulletin boards and electronic mail are forms of computer communication; both provide a means for using a microcomputer to access information held on a remote computer and to maintain contact with, and exchange information with, people over distances. While the same computer hardware and software is normally used as would be used to access the online information systems referred to in the previous chapter, electronic bulletin boards and electronic mail are, by and large, less formal means of information transfer than the large commercial online information services. Both are used in Australian schools for curriculum applications in the classroom, as a source of inservice education, professional development, and curriculum information for teachers, and for administration. Both may be part of other online systems; for instance, ABN and *Discovery* have electronic mail facilities for online users, while ASCIS and *The Source* offer both electronic mail facilities and bulletin boards. In addition, most electronic bulletin boards have an electronic mail facility, while the public electronic mail services, like Keylink and Dialcom, can be used to create bulletin boards. This makes definitions a little complex. However, because electronic bulletin boards and electronic mail are used differently, even when they are part of the same system, there is some justification for treating them separately in this chapter.

ELECTRONIC BULLETIN BOARDS

While online information services have been available since the 1960s, changes are occurring in this industry which are already having an impact on schools and school libraries. One of the most interesting is the "democratisation" or "popularisation" of online information. Just as desktop publishing has revolutionised print publishing, making high-quality printing facilities available to people and organisations who could not afford them years ago, so developments in computer-based information services are enabling small organisations and individuals to set up services of their own. While it is unlikely that these small services will ever challenge the "multinationals" like ORBIT or DIALOG, it does mean that people have a wider choice of online information services, many of which are now local and cheap - or even free. In the last few years, we have even seen individual schools and libraries become online information providers through their own electronic bulletin boards.

Electronic bulletin boards (also called "bulletin board systems" or BBSs) are simply another form of computer communication - a way of exchanging information and contacting people via the computer. They are like the traditional thumbtack notice boards or bulletin boards in that people can display notices which others can read and comment on. However, they take this concept a great deal further, providing a forum for the rapid exchange of information between people who may be a long way away from each other or who would never venture into the same places. Some electronic bulletin boards are general "chat" services; others are for people with particular interests. There are even "personal contact" bulletin boards - the electronic equivalent of the "personal" columns in

the newspapers. People use electronic bulletin boards to advertise things, buy or sell things, exchange ideas, and/or appeal for information. Educators have been quick to appreciate electronic bulletin boards as a means of making contact with fellow professionals.

Some electronic bulletin boards are run by clubs and societies, computer stores, professional associations, government departments, libraries, education authorities, even schools. Others, however, are set up by individuals as an extension of their interest in computers. Many are free - the user pays only the cost of the telephone call. The people who run the boards are known as "system operators" or "sysops". They set up the board, establish the access procedures, decide who will be allowed to dial up, and make the rules about how the board will operate. However, the electronic bulletin board is actually run on a day to day basis by the computer and software, so that the "sysop" need not be near the computer (or even at work or at home) for callers to use the board.

Most electronic bulletin boards offer a range of facilities for users, including:

- bulletins posted by the system operator or other users;
- an electronic mail service so that the user can send and receive messages from other users;
- a "conferencing" facility to enable several users, often living a long way from each other, to discuss a particular topic over a period of time, by means of typed messages;
- "chatting", a means by which two users logged onto the system at the same time can "talk" to each other over distances by typing messages which are displayed on both screens;
- games, including interactive games, often with several people participating (chess and fantasy role-playing games have been most popular);
- downloading software - software which is stored on the bulletin board system and which the users can load into their own microcomputers for later use (with a caution here about the danger of computer viruses when the software on the board is not checked by an authority before it is mounted);
- networking - providing links with other computers and electronic bulletin board systems, so that the electronic bulletin board becomes a "gateway" to other services.

In Australia, several electronic bulletin boards have been established by state education authorities. In South Australia, the Angle Park Computing Centre's NEXUS bulletin board system, available to teachers and schools throughout the state, provides a range of "sub-boards" covering areas of special interest, or catering to the needs of special groups. Among the sub-boards are boards for teacher librarians, mathematics teachers, people involved in special education, people interested in fantasy literature. The electronic mail facility on the system allows for individuals to contact each other. In addition, the NEXUS system makes available a file of the *Australian Associated Press (AAP)* news service, which can be searched by keywords and the relevant articles downloaded. Until recently, NEXUS has been free to schools, though telephone charges have still had to be paid; however, with a new and improved version of NEXUS now available, a small membership charge has been introduced. In Victoria, electronic bulletin boards operated by sections of the Ministry of Education include SCI-NET for science teachers throughout the state, SCEC-NET for computer teachers, and LIB-LINK for teacher librarians. In

Queensland and New South Wales, the Keylink electronic mail service operated by Telecom Australia has been used to set up electronic bulletin boards for teachers and students. In Western Australia, an electronic mail and bulletin board system called the Information Transfer System is being developed to provide electronic communication between schools. In addition, individual schools have created their own electronic bulletin boards, for various reasons: as an activity of the computer club; as a way of enabling parents and community members to keep in touch with school activities; as an information service for the school community; as a means of teaching students about communications technology.

While most people are quite happy to be information users, accessing the electronic bulletin boards to take advantage of their services, others do want to become information providers. There is a great deal of information available for those who wish to set up an electronic bulletin board system of their own. Basic requirements are a microcomputer with a hard disk drive, a modem, a dedicated telephone line (a line used only by the computer), and bulletin board software. Some suitable software is available "in the public domain", that is, copyright free, at very minimal cost; there are also commercially-available software packages which are suitable. It is possible to set up as a "sysop" with a basic electronic bulletin board fairly cheaply; on the other hand, it is also possible to get very fancy and spend a great deal of money indeed. How much needs to be spent will depend on the amount of usage envisaged, the number of users likely to access the system, and the features that will be offered.

It is evident in the professional education literature that interest in electronic bulletin boards is growing, and that they have a wide range of applications in education. This is reflected in the fact that papers have been given on this topic at the last three annual Australian Computers in Education conferences (1987 in Adelaide, 1988 in Perth, and 1989 in Canberra). Electronic bulletin boards have implications for information access in the school, for information dissemination, and for teaching and learning. They can be a very useful resource. It is important, then, that teacher librarians are aware of them, and take advantage of them in meeting the information needs of the school community.

ELECTRONIC MAIL

In March 1989, the Australian House of Representatives Standing Committee on Employment, Education, and Training, produced a report, *An Apple for the Teacher?: Choice and Technology in Learning*, which described electronic mail in the following terms (p.32).

> "Electronic mail whereby messages are exchanged electronically ... improves the ability of users to work collaboratively in developing and sharing ideas, advice, and information, yet it frees them from the need to communicate simultaneously. One central computer functions as a clearing-house among users of the network. Messages that have been sent are stored in the central computer until the addressee "logs on", at which time the message is presented on the addressee's screen. Systems software used for electronic mail also permits users to send messages to a public "bulletin board" where any other user can read and respond to them in the same way. Multiple bulletin boards can be set up and access to them can be restricted if desired."

Telecom Australia's national electronic mail service, Keylink, and OTC's international electronic mail service, Dialcom, are now being used by more than one thousand schools across the nation. Keylink provides the basis for several national and state projects related to the educational use of electronic mail, while Dialcom provides the basis for international projects such as "Computer Pals Across the World", which involves schools

in more than forty countries.

There can be educational benefits for school students, personal and professional development benefits for teachers, and administrative benefits, in the use of this form of communication. For school libraries, there are possibilities related to access to information held in locations external to the school, and for inter-library loans, as well as for professional contact and professional development.

SOURCES OF INFORMATION

Directories of electronic bulletin boards are available in the United Kingdom and the United States which list thousands of boards, while there are known to be thousands more that are not listed. In Australia, there is no current directory published. However, lists of boards appear monthly in computer journals like *Australian Personal Computer* and *Your Computer*. In addition, electronic bulletin boards themselves are good sources of information about other boards. Boards are available on almost any topic - from farming to war games to books to cooking to computing.

OPERATIONAL ASPECTS

To dial up and use an electronic bulletin board or an electronic mail facility, the following are needed: a microcomputer (any kind); a modem; a telephone line; and communications software. The same hardware and software used for accessing online information services will be satisfactory. If any sustained use is to be made of electronic mail, a word processing package is needed, so that messages can be created "off line", before being sent via electronic mail. If long messages are typed directly into the electronic mail system while online, then the telecommunications costs will be unthinkable. A printer is necessary if electronic mail messages are to be "downloaded" for later reading or display.

Dialling an electronic bulletin board is usually a simple procedure - in fact, most boards are deliberately designed so that inexperienced users will not be frightened off by the requirements. To use some boards, a "username" or "user ID" and "password" are required; these are either obtained in advance from the system operator, or are given as part of a "registration" procedure when a new user first logs on. Other boards are open for anyone to dial in at any time.

Many electronic bulletin boards are "menu driven" - that is, the user is presented with a list of options on the screen, from which a choice is made. It is easy to learn to use one of these boards, but, once you know the system well, the menus can become tedious. Other boards are "command driven" - that is, the users have to learn a set of simple commands which enable them to move around the system. "Help" screens are usually provided as a learning tool and a memory aid. These systems are faster, but less "user friendly", particularly for the novice or occasional user.

Electronic mail services tend, on the whole, to be less "user friendly" than electronic bulletin boards, but the requirements are the same: a "user ID" and "password" before you can log on. In addition, access to a directory of users of the service, with their "mailbox address", is necessary in order to send mail on most systems. Sometimes the directory of users is provided online. When you become a subscriber to an electronic mail service, you will be provided with a manual, a directory, and access details. These should be studied carefully before you "go online" for the first time. Unlike the electronic bulletin boards, the commercial electronic mail services are not cheap, and online mistakes can be expensive. However, use of electronic mail is not difficult, and a few practice sessions, with the manual close by, will normally be sufficient for teachers to

acquire reasonable proficiency.

As for the use of online information services, costs associated with using electronic bulletin boards and electronic mail can be divided into two types: "one-off", establishment costs; and ongoing costs associated with using the systems. The establishment costs are as follows:

- the cost of the microcomputer, modem, communications software, and word processing software, if the school does not already have these;
- the cost of an outside telephone line, if this is not already available, and if it is needed (it is possible to use electronic bulletin boards and electronic mail services via some switchboards, but not, generally, through Commander systems);
- any new furniture needed, such as a trolley for moving the computer around, or a table or desk;
- if the system is to be used with classes, an extension such as Kodak Datashow, to enable the screen image to be projected via the overhead projector for large-group viewing;
- initial staff training.

In addition, funds will need to be allocated on an ongoing basis for:

- subscriptions to the electronic mail services, and to the electronic bulletin board services if necessary (in fact, few of the electronic bulletin boards used by schools have a subscription fee);
- telecommunications charges;
- equipment maintenance and repairs;
- computer paper and floppy disks (for downloading messages).

SELECTION CRITERIA

In most cases, particularly for electronic bulletin boards, schools will want to join more than one system. For some schools, the choice of an electronic bulletin board or electronic mail service will be dictated by the fact that the education authority is using a particular system, and so schools will need to use that to communicate with the authority and with other schools in the system. Sometimes a choice may be governed by the fact that the bulletin board or electronic mail facility is being provided on an online system that is already being used by the school for other purposes - for example, the electronic mail facility on ASCIS. However, when appropriate, the following criteria should be taken into account when choosing an electronic bulletin board or an electronic mail system.

- Costs - both monthly or annual subscription costs, if any, and ongoing access costs.
- If a system is based in a remote city or town, whether or not it can be accessed via a packet-switched network such as AUSTPAC or OTC Dialcom to reduce online costs.

- Degree of user-friendliness of the system - while experienced users may be happier with a command-driven system, those new to electronic communications may be looking for at least the option of using menus to work through the system.

- Quality of documentation and manuals provided; quality of online "help" in using the system; availability of voice telephone support.

- System security, including password access, access to accounts, and security of documents on the system, where this is important.

- In relation to electronic bulletin boards, important considerations would include:

  the aims of the board;

  the type and level of information provided;

  accuracy and reliability of information;

  frequency of updating;

  organisation of the information for access;

  users of the board, including number of users, their interests, and their level of expertise in the area of interest;

  access to other information and services via the electronic bulletin board, for example, "gateways" to other services, extra databases on the system (such as *AAP* on NEXUS), access to electronic mail;

  facilities to create messages "off line" with a word processor, and then upload them to the board at high speed (to minimise telecommunications costs);

  facilities to download unread messages and documents into the microcomputer, to be read "off line";

  facilities for "chatting" and conferencing (if required);

  facilities for downloading software, if required, and steps taken by the sysop to ensure the integrity of software libraries on the system.

- In relation to electronic mail, important considerations would include:

  users of the service, including number of users and type of user (you need to join the electronic mail service most likely to be used by the sort of people with whom you want to communicate);

  ease of use, consistency and simplicity of commands;

facilities offered, including "gateways" to other services, the ability to create closed user groups and electronic bulletin boards on the system, "chatting", conferencing facilities;

facilities to create messages "off line" with a word processor, and then upload them to the electronic mail system at high speed;

facilities to download unread messages and documents to be read "off line".

APPLICATIONS IN THE SCHOOL

Electronic bulletin boards and electronic mail are being used in schools for administrative purposes; for fast access to information outside the school; for teacher inservice and continuing education; for communication with education authorities, parents, colleagues in other areas, and other schools; for research and development projects; and for classroom applications. The Queensland Department of Education has an electronic bulletin board service on Keylink, to "give students the opportunity to relate and communicate with other students throughout the State", and to provide administrative links (McNulty, 1989, n.p.). In Western Australia, the Ministry of Education has trialled electronic mail links between schools. In the Northern Territory, the Edlink territory-wide network, based on an IBM mainframe computer in Darwin, provides facilities for electronic messaging, including the use of electronic mail for inter-library loans between school libraries and between school and other libraries. In the Riverina Region of southern New South Wales, state schools are using electronic mail for teacher inservice, for exchange of information and documents between schools, and for electronic mail exchanges between students. A series of booklets has been produced by teachers in the region, each dealing with a particular curriculum unit in which the use of electronic mail or an electronic bulletin board has a part, either as a tool or as a resource. (Walker, 1989)

Electronic bulletin boards and electronic mail have been used in curriculum applications in a wide variety of ways, for information-gathering for projects, for process writing exercises, for communication with other countries and with other areas, for extension work in foreign languages, for classroom work in association with media studies, science, social studies, geography, mathematics, language, and reading. They have found an important use in special education, since it is possible for physically and otherwise handicapped students to communicate via electronic mail, without the recipient being aware of the disabilities affecting the sender. In 1988, several projects associated with the Australian Bicentennial involved the use of electronic mail or electronic bulletin boards; some of these projects have been ongoing since the Bicentennial, or have had more recent and ongoing "spin-offs". Some recent or current projects are outlined below.

- The Computer Pals Across the World Project involves schools in many different countries, including the United States of America, Australia, New Zealand, Canada, the United Kingdom, Peru, France, West Germany, Japan, Sweden, and China. The Project matches schools in different countries, and sets guidelines and goals for their electronic mail exchanges, so that the use of computer communications is firmly based in the educational programmes of the schools. One of the Project's founders, Malcolm Beazley, said in 1988 (Czerniejewski, 1988, p.5), "Having witnessed the reactions of many disappointed students during the period of electronic mail trials in this country (disappointments which resulted from lack of sound educational programmes within which the electronic exchange could take place), I felt it was imperative

for this project to have set educational aims and objectives as well as an established program, which would guide the students' experience in this electronic mail medium. Thus the Project is viewed as more than just an exercise in electronic mail but rather as an electronic language exchange project which provides a basis for incorporating all aspects of the English Language Arts. First and foremost, the Project aims to provide a writing environment in which students can write for a real audience." Students are able to share experiences, opinions, discussion of current events, social and cultural information, creative writing, and newsletters through the Project. It began in 1983 as the Australaskan Writing Project, as link between Alak High School in Wainwright, Alaska, and Turramurra High School in Sydney. Now, almost eight hundred schools are involved, and two international conferences associated with the Project have been held (one in Alice Springs in 1988, and one in Oregon in 1989).

- In 1987 in New South Wales, the Education Department's Computer Education Unit undertook a trial of the Keylink electronic mail system. In a report on the trials at the Information Online 88 conference in Sydney, Martha Heeren noted that "electronic mail offers many possible ways of enhancing the curriculum for students and giving support to teachers by expanding the communication network, and reducing geographic, environmental, and professional isolation". (Heeren, 1988, p.243) Student use related to language and writing development activities; data gathering for projects concerned with weather statistics, consumer prices, and Australian history; fostering communications networks for children with disabilities; computer awareness and computer studies; and for projects associated with the Australian Bicentennial. Teacher use related chiefly to professional development activities; exchanging information about curriculum topics, resources, and approaches; and sharing such things as worksheets and tests. The use of electronic mail by New South Wales continues, through a bulletin board on Keylink. More than four hundred schools used the service in 1988.

- In April 1989, Keylink was used by New South Wales schools to enable students across the state to participate in the activities associated with the visit to Australia of children's author Roald Dahl (McKenzie, "Galah Session", 1989, p.33). Such author tours often involve only schools in major population centres, and electronic mail was seen as a way of extending this involvement to remote schools. In preparation for an interview with Dahl in Sydney, twelve primary school students at Belmore South Primary School (a Sydney suburban school) placed a message on Keylink, asking students throughout the state for questions that could be put to the author. Responses came from schools up to nine hundred kilometres away (including Lord Howe Island Central School, and Hay Public School in the state's far interior). The Belmore students edited the questions for the interview, which also involved 190 students of the Broken Hill School of the Air, participating by teleconference links. The results of the interviews were edited and shared with all the participating schools via Keylink.

- In the Riverina Region of the New South Wales Department of Education, a series of booklets has been produced by teachers, each one covering a unit of work, incorporating ideas for the educational use of electronic mail. The initial impetus came from work done at two writing workshops held in Wagga Wagga in March and May 1989. Each unit booklet includes a rationale, aim, objectives, teaching strategies, resources, and evaluation strategies; the use of electronic mail forms a very small part of most units. The unit booklets cover a wide range of curriculum areas, from lower primary to Year 12. Units include *The Daily Rag: A Unit on Making a Newspaper* (lower primary);

Environmental NSW (Years 7 to 10 computer studies, science, agriculture, social science); *Poll a Pollie* (upper primary to upper secondary social studies, general studies, media studies, legal studies, society and culture); *Rain* (lower primary science); *Living Together* (Year 6 integrated unit).

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CHAPTER FIVE

OPTICAL DISK MEDIA

INTRODUCTION

The term "optical disk media" refers to disks where light, usually in the form of a laser beam, is used to "read" encoded information from the disk. The familiar audio compact disk, or CD, is but one form of optical disk media. Another term used to refer to these media is "optical storage systems" or OSS; optical storage systems include all optical disk media, and also media that use optical technology to store information on materials other than disks. Optical storage media have the potential to store vast amounts of information, including sound, still and moving images, text, and computer programs. The first viable commercial optical medium was the videodisc; this was followed by audio compact disks (CDs) in 1982, and CD-ROM (Compact Disk - Read Only Memory) in 1985. Many other variations and developments of these media have appeared or are appearing, including disks on which the user can "write" information but not change it once it is there (CD-R or WORM) and disks which are erasable or rewritable (CD-E or EPROM). To use these media, a microcomputer, a videodisc or CD-ROM player or "drive", the optical disk or disks, and access software, are needed. All must be compatible with each other; disks designed for use on one type of hardware or with one type of access software, cannot normally be used on other systems.

The main attributes of all optical disk media are as follows:

- they can store enormous amounts of information in a very small space;
- information on different parts of the disk can be searched very quickly as needed;
- they are capable of storing text, data, sound, and images;
- they are very durable and hard-wearing;
- they are stable and the data is not easily corrupted;
- they are easily transportable.

The disadvantages or limitations relate mainly to cost and to the lack of standardisation between different brands and types of hardware, disks, and access software.

Although creating the master for an optical disk is very expensive, once the master disk is made, the disks can be mass-produced from it for sale relatively cheaply. As the market expands, costs will continue to fall. This has already occurred in the field of audio compact disks, and both CD players and disks are now relatively competitively priced. The success of the audio compact disk has meant that a lot of the development costs have been recouped, and this has also meant that CD-ROM is also looked upon favourably as a long-term investment. Already, the cost of the Grolier *Electronic Encyclopedia* on CD-ROM is less than that of the printed version, though, of course, there has to be an initial expenditure on the CD-ROM drive or player to use the CD-ROM version.

There have been problems with lack of standardisation in relation to CD-ROM and other optical disk media, and in relation to the hardware and search software as well. While some attempts have been made to create a standard for videodisc and CD-ROM, these have not been entirely successful, with the result that disks created for one system cannot be played on another. With new developments occurring all the time, the optical storage media are constantly moving ahead of attempts to introduce standards. The situation is complicated by the fact that firms involved in research and development are competing to have their systems accepted in the market.

Because optical disk media can be used to store information of all kinds, and provide quick access to it, it is vital that teacher librarians monitor developments in this field, and assess these developments in relation to the needs of the school. Increasingly, CD-ROM disks of relevance to schools are coming onto the market, and with the appearance of cheaper recordable and erasable disks, more educational applications will be developed. Furthermore, students need to be aware of these new forms of information technology and to develop the skills to use them.

VIDEODISC

Introduction

The earliest viable form of optical disk media was the videodisc, the first commercial videodisc being released in 1978. A videodisc is a thirty-centimetre diameter double-sided disk that can hold between thirty and sixty minutes of video per side. It was originally developed to store pictures, with the aim being to sell disks of moving pictures to the home market. However, it was found that these disks could not compete with videotape, despite the fact that the quality of the image and sound was better - most people simply do not want to build up a large collection of films. However, the 1980s saw further developments in the medium which made it more commercially appealing; these developments included the recording of computer programs and data, as well as film, on the disks, and the designing of disks aimed at the educational market. One of these was the LaserVision-ROM format used for the BBC Domesday disks in the United Kingdom. At present, the industry is predicting a revival of the videodisc format, based on marketing of musical videodiscs, and on the production of combination players (that is, players that will accept audio compact disks, videodiscs, and CD-V or "Compact Disk-Video"). The much-heralded future development of erasable videodiscs may also spur development of more videodiscs.

Videodiscs have a number of advantages over videotapes, slides, filmstrips, and films, in that they have a greater storage capacity; they provide rapid access to images and sound; they provide an index to the information on the disk; they are easy to use and to store; they are durable, stable, and portable; the reproduction of images and sound is of a high quality; they provide the capability to play frame by frame, to "freeze frames" (and leave them on the screen for long periods of time), and to replay and move forward and backwards easily; they are quiet in operation; and they don't need a darkened room for effective use. Some enable the user to structure sequences of images and sound to suit specific purposes. However, costs have tended to remain high, and so the medium has not been able to compete with VHS and Beta videotape formats which can be used to record films. While the projected recordable and erasable videodiscs may change this, there are other, newer media, like CD-V, which are also beginning to compete in this market, too. In addition, the problem of standardisation, in relation to hardware, access software, and disks, remains a real one, as does the fact that there is not a large number of commercially-successful videodiscs on the market from which schools can choose.

Operational Aspects

To use ordinary videodiscs, all that is needed is a videodisc player and a television set. The videodisc player itself can have different facilities which give increasing levels of control and interactivity, such as options for viewing still frames, forward and reverse playing, and search facilities. With an inbuilt microprocessor in the videodisc player, it is possible to use programmed sequences of film and sound. However, it is now the case that videodisc players are almost always used in conjunction with a microcomputer and appropriate search software as well as a television screen. This gives the user greater control, allows for greater flexibility in using the information on the disk, and provides a range of search and presentation options for the user. Disks which are created for use with one type of videodisc player, software, and microcomputer, can normally be used only on that specific equipment; for instance, the BBC Domesday disks can be used only on the LaserVision player with a BBC Acorn microcomputer.

Selection Criteria

Selection criteria relate, first, to the information on the disks, and, secondly, to the videodiscs as a medium (in comparison with other appropriate media).

- Information/content. As with other information media, the teacher librarian needs to look at the relevance of the information on the disk to the school curriculum, the quality, accuracy, and timeliness of the information, the clarity and suitability of the pictures and other graphics, the sequencing of the information, and the attractiveness and readability of the screen displays.

- Ease of use. It is important that the system is user friendly, that the instructions are clear, that the manual is easy to read and provides appropriate information, that there are help screens available, that the commands are simple and used consistently throughout the system.

- Hardware. The cost of the hardware is an important consideration in deciding whether or not to purchase a videodisc. It is important that any new disks that are purchased be compatible with hardware and access software already in use in the school. If a new videodisc player is being considered, the school might be advised to consider one of the more recent players that supports audio compact disk as well as videodisc.

- Cost. This needs to be considered both in relation to the school budget, and in comparison with other appropriate media.

Applications in the School

The takeup of videodisc technology in schools has been slow, although they have been used for a number of years by training institutions. This has been a result of a number of factors, including the lack of a range of suitable disks, the cost of development of disks, the incompatibility of the different systems, and the current prices. Nevertheless, as already mentioned, videodisc technology does have many advantages in the classroom, including ease of use, clarity of images, speed of access to information, and scanning and play options (such as freeze frame, slow play, reverse play, and the ability to prestructure sequences of images for replay for a particular purpose).

Videodiscs can provide pictorial and other material for teachers and students to use in a variety of ways. An example of this is the *Granite State Sampler*, a viseodisc produced by the American state of New Hampshire and supplied free to all their schools. It includes archival material such as photographs and film, and covers areas such as

geography, natural history, history, famous people, government, and local traditions. Teachers (and students) can develop individual audiovisual presentations using the material on the disc. The State Library of New South Wales is at present creating a videodisc incorporating 54,000 historical photographs, and this could provide a valuable resource for Australian teachers.

The BBC Domesday Project disk set is one which has been purchased by many British schools; it gives an idea of the possible applications of this medium, and remains an important example of what can be achieved with this technology. This project was developed to celebrate the nine hundredth anniversary of William the Conqueror's Domesday Book survey of his kingdom; it provides an overview and an in-depth survey of the United Kingdom of today, using today's technology, in the same way that the original Domesday Book provided comprehensive information for its day. The national disk contains some 50,000 pictures, video sequences of events that took place between 1980 and 1986, text, and graphics, covering a wide range of subjects, including all aspects of everyday life. It provides statistics, data from the 1981 census, extracts from Hansard, and newspaper and magazine articles. It can be searched in many different ways, using specially-designed access software, and the statistical data can be manipulated to provide graphs, tables, and summaries. The community disk contains 24,000 maps, major city street plans, aerial and satellite photographs, and photographs and drawings of places, buildings, and monuments throughout the country. It was compiled with the help of students in some 14,000 schools, with community groups and other organisations also taking part in the collection of the information. The educational applications of these disks are varied, and they can be used with groups at all age levels, since the search software allows for many different approaches to the information. However, while they are an important resource for schools in the United Kingdom, they have little relevance in Australian schools; nevertheless, if only because the Domesday Project has been an exemplar for some Australian projects (which have yet to see the light of day), it is important in any discussion of the medium.

There have, however, been some Australian videodisc projects which have either been very successful, or shown some potential. Within the former category is the *Aussie Barbie* videodisc project, undertaken in South Australia, which resulted in an important videodisc to teach social aspects of English as a second language, particularly to adults and young adults. Among those which have shown some potential was the *Ask the Workers* careers information videodisc produced by the Western Australian Ministry of Education, which won some production awards, but was never really developed into a usable careers reference system.

AUDIO COMPACT DISKS

Audio compact disks, or CD, first appeared in 1980, and became commercially available in 1983. They have enjoyed world-wide success because of their ease of use, clarity of sound reproduction, and durability. The fact that an industry standard has been developed by Philips and Sony has helped to ensure their acceptance. They are replacing long-playing records and audiotapes as a medium for storing music and other recorded sound. A compact disk player is needed for playback. With the commercial success of the medium, the price of the hardware has fallen dramatically since the players first came onto the market. Their advantages and price are ensuring their gradual acceptance in schools as an alternative to records and audiocassettes.

CD-ROM

Introduction

CD-ROM as an information storage medium developed out of the audio compact disk; originally they were used to store text, but since then they have been used to store images and computer programs as well. CD-ROM disks are the same size as audio compact disks (twelve centimetres in diameter); each one has a usable capacity of approximately 550 megabytes of storage, that is, the equivalent of five hundred to one thousand floppy disks, or 200,000 A4 pages of printed text, or 2500 full-screen photographs. The standard CD-ROM is not capable at present of presenting full-screen moving pictures or synchronised sound and image, though newer optical storage media do provide for this. CD-ROM is particularly suited to the presentation of large amounts of text, as in large databases, and it provides significant advantages in terms of speed of access and ease of use.

Databases already on CD-ROM include full-text databases and reference works such as Grolier's *Electronic Encyclopedia* (the *Academic American Encyclopedia),* the *Oxford English Dictionary, Microsoft Bookshelf* (which includes a range of basic reference books, such as *The American Heritage Dictionary,* Roget's *Thesaurus,* the *World Almanac and Book of Facts,* Bartlett's *Familiar Quotations,* and others), the Bible, the *Facts on File News Digest,* the McGraw-Hill *Science and Technology Encyclopedia,* and *The World Factbook.* Disks of shareware software have been well received, as have disks of clip art illustrations which users can load into word processed documents on their microcomputers. Other databases on CD-ROM include statistical databases such as *CDATA86* (data from the 1986 Australian census), bibliographic databases such as *British Books in Print* and *Books in Print,* abstracting and indexing services such as *Wilsondisc* and *Magazine Article Summaries,* and large reference databases such as *ERIC* and *Medline.*

Recent developments have led to improvements in access times for searching CD-ROM disks, and to improvements in networking CD-ROMs for remote access within an organisation. In addition, research is going on at present which should result in better access software; in particular, research in the areas of artificial intelligence and expert systems seems to have something to offer in this regard.

When considered in relation to print media, CD-ROM has some strengths and limitations, which affect its use. While the hardware is a significant cost, once it is in place, it can be used for a range of CD-ROM disks. In addition, once the hardware has been purchased, the cost of reference tools on CD-ROM can be considerably cheaper than their print equivalent; for instance, Grolier's *Electronic Encyclopedia* on CD-ROM is approximately half the price of the equivalent print work, the *Academic American Encyclopedia.* The CD-ROM is more durable than the print version; it is difficult to damage; networking can provide access for more than one user; searches are very quick when compared with manual searches, and more likely to result in the locating of all relevant information; and information can be downloaded to the microcomputer, manipulated, and printed out in a format that suits the user. Probably the most significant advantage of CD-ROM over print media is the range of search options, with Boolean and other search strategies being available, and with provision for broadening or narrowing a search as it progresses. This usually means that more information is found as a result of a search.

When CD-ROMs are compared with online information services, strengths and limitations emerge, which have to be taken into account. Many of the online information services now make all or part of their databases available on CD-ROM. An example is the *ERIC* database, made available on CD-ROM by DIALOG and others. When this

happens, the online version of the database will normally be more up-to-date than the CD-ROM version, since the online service will be updated weekly, daily or more frequently, while the database on CD-ROM will normally be updated quarterly or less frequently. However, where recency of the information is not a critical factor, use of the CD-ROM version will have advantages: because there are no online search charges, there will be no pressure to complete searches quickly; users can browse the database, using the screen prompts as a guide; and the CD-ROM version is usually more user-friendly. Some libraries are taking advantage of the strengths of both media by doing retrospective searches of a database on CD-ROM, and then going online to locate the very recent material. The annual subscription for a database on CD-ROM will usually be much greater than the subscription for using the same online service; however, once the CD-ROM subscription has been paid, users have unlimited access to the database, whereas online charges have still to be paid to use the online version. Clearly, where a lot of searching is done on a particular database, and where a lot of data is retrieved through those searches, then the use of the database on CD-ROM will represent good value. However, where a database is used infrequently, then the online option will be better value. Some schools have found the use of a database on CD-ROM to be useful in teaching search skills, particularly where they cannot afford much time online.

Operational Aspects

To use CD-ROM, a microcomputer, CD-ROM player or "drive", and access software are needed. The microcomputer must have an interface card and socket which matches the CD-ROM player; these will usually be supplied by the vendor of the CD-ROM player. The access or search software will normally be provided with the CD-ROM disk when it is purchased; while the same access software is used by some producers for a range of disks, generally speaking, each new disk will require the use of different software. The access software must be compatible with the operating system of the microcomputer, and with the CD-ROM drive. A colour monitor is required for some CD-ROM disks; with some others, while it is not essential, it does make the screen displays easier to read and interpret. There are still other disks, however, which have been designed to operate most effectively in a monochrome environment, though most of these can still be used with a colour screen. If printouts are required, then a printer will need to be linked to the microcomputer.

While a microcomputer with a CD-ROM drive can still be used for other applications in the library, it is generally found to be more efficient to have a machine set up for CD-ROM use on a more-or-less permanent basis, since staff time will be taken up with setting up the CD-ROM each time it is used. In addition, experience in many libraries has shown that the use of CD-ROM soon becomes sufficient to make a dedicated microcomputer necessary. Setting up CD-ROM is not always a hassle free experience, even for the experts (partly because of the problem of lack of universally-recognised standards across hardware, software, and disks), so teacher librarians should be prepared to seek help from hardware, software, and disk vendors where necessary. Developments in networking, and the appearance of multiple disk players or "juke boxes", will provide greater scope for libraries where users want to access information on a range of disks, or where provision needs to be made for multiple users.

Selection Criteria

As with other media, general selection criteria which are applied to library resources will also be applicable to CD-ROM resources. In addition, some special criteria, related to this medium, will be relevant.

- Information/Content. While the usual criteria of timeliness, accuracy, appropriateness in terms of reading level and interest level, and relevance to the

school curriculum, will apply, as suggested above, other information/content criteria will be determined by the type and format of the information on the disk; for instance, a CD-ROM containing a version of an online database would have to be assessed using many of the criteria normally applied to online information services.

- Ease of use. This relates primarily to the access software which enables the user to search and manipulate the data on the CD-ROM disk. Is the system user friendly? Are the manuals, screen instructions, and "help" messages adequate? Are there options for the novice user and the experienced user? Can an experienced searcher take short cuts through the system? It should be noted that some databases, like *ERIC,* are available on CD-ROM in different versions, with different search software for each; when this is the case, and when there are no problems with hardware incompatibility in relation to one or other of the versions, then the software which offers the search options most appropriate to the needs of the users of the library should be given priority.

- Compatibility. Although there is an industry standard for the production of the CD-ROM disks, disks produced for one type or brand of hardware cannot normally be used on another. The microcomputer, CD-ROM player, search software, and the computer operating system must be compatible with each other and with the CD-ROM disk to be used. Therefore, when selecting a brand of hardware, it is important to keep in mind the type of CD-ROM disks available for that hardware, so that the system will run the disks that are likely to most suit the needs of the library.

Applications in the School

There are many applications for CD-ROMs in education and in school libraries. The range of these applications is indicated by the examples cited below.

- Reference support. Many reference books are now available on CD-ROM; examples are Grolier's *Electronic Encyclopedia* and the *Microsoft Bookshelf* disk mentioned earlier.

- Resources for teachers and students. Collections of clip art, images, typefaces, illustrations, and computer software, are available on CD-ROM; users can download from the CD-ROM into their own microcomputer, and then use the computer programes or manuipulate the illustrations and graphics for their own purposes. The *Science Helper K-8* CD-ROM has nearly one thousand lesson plans for science and mathematics, which can be downloaded, and adapted if necessary, for use in the classroom.

- Statistical information and information analysis tools. The *C-DATA86* CD-ROM, from Space-Time Research provides the Australian Bureau of Statistics census data from 1981 and 1986. It covers population trends, housing, income, employment, education, businesses, among other things. Large though the database is, the specially-developed access software allows for quick and easy searching, and the results of searches can be mapped, presented graphically, or presented as statistical tables. Comparative and analytical presentations are possible, including ones using student-collected data. With this tool was developed originally for people in business, for market research, and for forward planning, it has been used very successfully by schools such as The Wilderness School in Adelaide in economics and social studies classes. The distributors now offer a special education price for schools which is considerably lower than the normal price.

- Information skills. At least as important as the information contained on the CD-ROM is the potential of this medium as a resource in teaching information skills. The acquisition of database search skills is facilitated for novices, since there are no time constraints on the search process. However, it should also be noted that, although online searching and searching on CD-ROM have features in common, there are significant differences. This means that CD-ROM is not really an effective medium for teaching online search skills, as some claim, though it is a good resource for giving children an appreciation both of CD-ROM search skills and of the information search process in more general terms.

- Bibliographic tools. Where the database of an online information service is available on CD-ROM, it can be used by both teachers and students (depending on the content of the database) to find likely sources of information for projects and other purposes. The *ERIC* database on CD-ROM would be useful as a source of information for teachers about educational documents and resources, for instance. RMIT-INFORMIT is developing a CD-ROM which will contain a number of databases in the area of the Australian social sciences, education, and environmental design; this will include a small subset of the ASCIS database. In addition, there are collection-building tools such as *Books in Print* and *Bowkers Reviews Plus* which are now available on CD-ROM.

- Library catalogue data. For large libraries, LC MARC catalogue records have been available on disk for some time. Here in Australia, ASCIS is considering the possibilities of supplying records from its database on CD-ROM; the ASCIS records will go beyond just catalogue data, in many cases, and may include the abstracts and reviews which are attached to some records, and the additional information provided as part of some records, such as the records related to the holdings of the Lu Rees Archives or the software review subset.

- Library catalogues on CD-ROM. Some Australian libraries are investigating the possibility of providing their library catalogue on CD-ROM, as has been done successfully by a number of libraries overseas. The CD-ROM copies of the catalogue are usually produced by a bureau from computer tapes of catalogue data supplied by the library. Libraries using CD-ROM catalogues normally update with a new version every three months. The advent of WORM and the newer CD-E disks could make CD-ROM catalogues easier to update. The advantages of CD-ROM catalogues include the fact that they are quicker to produce than a card catalogue; they take up less space; they can hold massive amounts of information (more than most hard disks of equivalent size); a wide range of search options is possible; and multiple copies of the catalogue can be made available wherever there is a CD-ROM player. Disadvantages (apart from those related to the initial costs of setting up any automated system) relate to the ongoing bureau costs for updates, and to the fact that the catalogue is always out-of-date soon after a new version is installed each quarter. In a library where only small numbers of items are catalogued, this latter may not be a significant problem.

SOURCES OF INFORMATION

Optical disk technology is developing rapidly; the industry is changing constantly, and new disk applications are appearing. Current periodicals and newsletters are therefore important sources of information. The computer pages of the national newspaper, *The Australian*, on Tuesdays, carry articles on developments in this field. Useful journals include *CD-ROM Librarian, CD-ROM Review, Electronic Learning, The Electronic Library, Online Searcher*, and the *Australian Laser Disc Newsletter*. Professional journals in the field of librarianship also carry useful articles from time to time - for example, *School Library Media Quarterly* and *Library Journal*.

International and national conferences, and the resulting volumes of proceedings, have focussed on developments and applications in the field of optical disk technology. The Australian "Information Online" conferences, held on a regular basis in Sydney, have sessions devoted to CD-ROM and other optical media, while the international series of "Online Information" conferences run by Learned Information each year in London, New York, Moscow, and other locations, have become important rallying points for those interested in research and development in this area. As a result, the volumes of proceedings make available information which can be found nowhere else. An Australian Optical Disc Conference took place in 1989, while the conferences of organisations like the Australian Computer Society and the annual Australian Computers in Education Conferences often feature CD-ROM and other optical media developments. Local seminars and workshops run by professional associations can provide a means for people to see the newer technologies, and perhaps even to use them in a workshop setting.

The suppliers of CD-ROM disks and CD-ROM hardware can be approached for demonstrations; they will also have a range of publicity materials and producers' catalogues.

NEWER OPTICAL DISK MEDIA

As has been noted, the field of optical disk media is one in which a great deal of research and development is occurring, particularly in the areas of greater interactivity, user interfaces, full motion digital video, and recordable and erasable disks. While the often clumsy acronyms and initialisms used to describe these newer developments make them seem difficult to understand, and even alien, they will be easier to use and to adapt to than it would appear now. Recent developments include CD-I (compact disk interactive), which is interactive and provides for sound, 3-D graphics, and even limited motion video in windows; CD-ROM XA (CD-ROM extended architecture), a format which incorporates the advances in audio, video, and graphics technology of CD-I, but maintains some degree of compatibility with CD-ROM; DVI (digital video interactive), which will allow seventy two minutes of video to be stored on a disk; and CD-V (compact disk video), which combines the capabilities of audio compact disks (for audio) and videodisc (for video). Among the latest product announcements from Philips is FMV/CDI, which stores an hour of full-motion video on the disk. Another area of development is in the field of disks onto which users can record their own information, and from which they can erase information. WORM ("write once read many") was one of the first disks of this type; it would allow the user to place information on a disk, and to access it, but not to erase it. CD-E (compact disk erasable) heralds the introduction of disks which function in a way similar to hard disks on a computer, on which a user can store information, manipulate it, and erase it. However, these disks are a long way from commercial development.

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CHAPTER SIX

HYPERTEXT AND HYPERMEDIA

INTRODUCTION

Teacher librarians have been familiar with the term "multimedia" for many years. However, now multimedia can mean much more than a sound filmstrip, videotape, or multi-projector slide show. With the use of a computer, different types of media, including text, graphics, still pictures, computer programs, stereo sound, and video, can all be integrated, and accessed through simple commands. "Hypertext" is a means of storing, organising, and accessing data on a computer in many different formats. It gives users the facility to interact with and manipulate the data to suit their individual needs, and provides for browsing and "serendipitous" searching. "Hypermedia" refers to the use of hypertext to access multimedia; in other words, hypermedia is a progression from both multimedia and hypertext, and incorporates both.

MULTIMEDIA

Multimedia in this context means either that the computer interacts with and controls the media hardware (such as a laser disk player), or that information on the different media is stored in a computer-readable form and is played back via the computer itself. Either way, what is produced is a computer-controlled package. The *Domesday* disks mentioned in Chapter Five are an example of the former; some CD-ROM disks provide an example of the latter. These developments mean that multimedia has become physically simpler to use. Currently, multimedia on CD-ROM is fully integrated, except for the capacity for full-screen, full-motion video; however, this should be available some time in the near future.

An example of a multimedia CD-ROM is the *Compton's MultiMedia Encyclopaedia*. The disk holds the complete set of *Encyclopaedia Britannica* (and also the *Webster's Intermediate Dictionary)*. This interactive electronic encyclopaedia provides information in various media formats, with facilities for searching and retrieval. Users are offered a range of search options. For example, if students wanted to browse pictures rather than text, they would select the screen icon representing "picture explorer". If they wished to read the text related to a particular picture, they simply select the text icon on the screen, and the text appears. They can then continue to move between text and pictures, or even information in sound form. In addition to the text, pictures, diagrams, maps, and charts (some in full colour), some thirty minutes of animation and sixty minutes of audio are included on the disk.

Presentation of information using multimedia means that users can choose to access information as best suits their needs or learning style. In addition, presentation is enhanced by the addition of a range of media. In the past, a person using a print encyclopaedia would have been able to read text about, for instance, a famous person, and perhaps see a photograph. Now, with multimedia, it would be possible to listen to that person's speech, or part of a musical composition written by that person. A search for related information would be much faster and easier than the traditional "index and volume" search of a print encyclopaedia; all that is involved is selecting icons and search terms or paths from the screen display.

HYPERTEXT

The term "hypertext" was coined in the mid 1960s, as a result of development work carried out in this field by Ted Nelson. It has come back into vogue with the introduction of large databases of information stored on CD-ROM and in other multimedia storage formats. Along with hypertext has developed the wider application - hypermedia.

Hypertext is computer software which provides a means of organising and accessing data. Hypertext may be used to create the data files, incorporating a variety of formats, and to search them using a range of search strategies. Hypertext-based data has interfile linkage which can produce advanced cross-referencing capabilities. Hypertext is associative; this means that a word, a phrase, or even a complete document, can be linked to (associated with) other words, phrases, or sections of text, so that the user can "browse" for information related to any word or piece of text appearing on the screen simply by selecting words or icons. In multimedia hypertext applications, there is the same ease of movement from text to related pictures, graphics, and sound. This allows users to employ a range of search strategies, to search in ways (such as browsing) which seem more natural than the traditional highly-structured computer searches, and to develop their searches as they go along, based on the type of information that they find.

Alternatively, hypertext may be used as a "front end" to provide better and easier access to existing databases (including remote online information services) in text or multimedia formats. Used as a "front end" to existing databases, hypertext offers the potential for the development of more "user friendly" systems. Research and development work is proceeding now on hypertext "front ends" to some of the online information services; work is also being done on using hypertext interfaces to provide the basis of better public access catalogues in libraries.

Using hypertext, the designer of a package can plan pathways for the user from one set and format of information to another. It is then up to the users how they navigate their ways through the information, and how they choose to manipulate it to meet their own needs and to suit their own purposes. Hypertext links the computer with the information stored in various formats on optical storage media, and provides the basis for a user interface (a means for the user to interact with the technology). Screen graphics are usually seen as the basis for such a user interface, with devices like the keyboard, the mouse, and touch screens being employed by different systems; work is advancing on voice recognition as a means of interaction (through which the user would simply speak to the computer to issue commands and carry out searches). In the future, developments in software and user interfaces could allow users to choose the mode of interaction that best suits their needs.

For those involved in information handling, the implications of hypertext are profound. It can be used to create individualised learning packages for all levels of education. It can provide more efficient means of managing information in a wide range of formats. It can provide information access and search facilities for users in ways that have not been possible before. It allows for the repackaging of information to suit particular user needs.

Hypertext-based packages can be purchased, complete with multimedia database and search software, ready for use. Already, there are some packages on the market, on a range of subjects, which are suitable for school use. Hypertext can also be used to develop a user interface to existing multimedia databases, on CD-ROM, videodisc, hard disk, or other storage media, or even to online information services, in which case, the developer would be purchasing the hypertext software and any necessary linking hardware. Users can also purchase the hypertext software to develop their own hypertext-based packages, assuming that they have the appropriate computer and media hardware. While the creation of hypertext packages takes careful planning and design, and is not by

any means a simple process, nevertheless some small applications have already been created in schools.

One of the best-known examples of hypertext software currently on the market is *Guide* by OWL International. Following on its release came *HyperCard* from Apple (not regarded as a "pure" hypertext program), and more recently, *Linkway* from IBM. Others include *ArchiText* from Brain Power and *Business Filevision* from Marvilin Corporation.

Hypertext-Based Packages

Over the last year or so, some "ready-to-use" commercial packages based on hypertext have come onto the market. Some examples are listed below.

- The Dinosaur HyperCard. This is designed for the Apple Macintosh computer; it requires one megabyte of memory, a hard disk, and *HyperCard* 1.2.1 for operation. Dinosaur Database and Dinosaurs Reference Stack are the two linked stacks that make up the *Dinosaur HyperCard*. The first contains information about the different types of dinosaurs; the latter gives notes about origins, classification, and notable museum collections dealing with dinosaurs.

- The First Fleet. Also designed for the Apple Macintosh, this requires one megabyte of memory, two 800K disk drives, and *HyperCard* 1.1. Again, *The First Fleet* is made up of two linked stacks - the Voyage Stack and the First Fleet Database. The user has access to maps and illustrations which in turn lead to other related information. A reference section includes such things as reading materials, music, and historical archives.

Hypertext Software

These hypertext software packages are designed for those who wish to develop their own hypertext applications, either as "front ends" to existing databases, or as standalone applications (for instance, as individualised instruction modules, or as in-house multimedia databases).

- HyperCard. This is widely used, since it is provided with every Apple Macintosh computer sold. *HyperCard* has been described as "... a personal software toolkit for Apple Macintosh computers which gives users the power to create, customise and manage information using text, graphics, sound, music, voice, and animation". *(Apple Australia Education News,* May 1989). The applications developer using *HyperCard* creates "stacks" (the *HyperCard* equivalent of databases), using HyperTalk *(HyperCard's* built-in programming language). These stacks contain "cards" or records which form the basis of the database. These cards can be linked in various ways through screen symbols called "buttons". The database searcher uses the mouse to "click" on the buttons to browse the information on the database, moving from card to card without necessarily having to type any commands or search terms.

- Guide. *Guide* (from OWL International) was the first true hypertext software to be developed for personal computers. It can be run on both Apple Macintosh computers and computers with MS-DOS operating systems. Because *Guide* is not as easy for a developer to program as *HyperCard,* its hypermedia applications are more limited. However, its hypertext interface has been

described as more consistent, making it a good tool for developing online documentation and help files. (Franklin, 1989)

School-Produced Packages Using Hypertext

As mentioned earlier, schools, with the right media and computing hardware and software, can produce their own hypertext-based multimedia packages; a few have already done so. An example is the multimedia project, known as "Grapevine", carried out at Lowell High School in San Francisco, California. Involving an English teacher, Patricia Hanlon, and librarian Bob Campbell, the project grew out of a class study of the 1930s period in America after reading *The Grapes of Wrath*. *HyperCard* stacks were used to link together the information the students had gathered through their research outside the school and in the library; the media incorporated included photographs, texts of interviews, articles, film, and other material. The idea was to produce a package which students could then use as the basis for their own projects. To create the package, Hanlon and Campbell used a Macintosh Plus computer, *HyperCard* software, and a videodisc player. Other technologies used in creating the package included scanning (for the input of images), digitising of sound, and a WORM videodisc. The end result was information stored on videodisc in a range of formats, and accessed using the microcomputer and *HyperCard* software. The students could select information from the disk, using simple search strategies, and then use it to create their own presentations about life in the 1930s. Through this package, they could learn at their own rate, in the context of a multimedia environment, and present their own interpretations and understandings in a range of ways.

SOURCES OF INFORMATION

Developments in the area of hypermedia/hypertext and multimedia are continuing, and information is being updated constantly. Among the sources of information are the following.

- Computer journals, including *MacWorld, PC Plus, Apple Library Users Group Newsletter*.
- Specialist journals related to hypertext and hypermedia, including *Hypermedia* and *HyperStudio Forum*.
- Professional association publications (especially publications of the relevant sections of those associations), including publications of the Australian Library and Information Association, the Australian Computer Society, the Library Association (United Kingdom) Information Technology Group, and the constituent groups of the Australian Council for Computers in Education (groups such as the Educational Computing Association of Western Australia, ECAWA, and the Computer Education Group of New South Wales, CEGNSW).
- Conferences, seminars, and inservice courses run by these professional associations and groups.
- Local software and hardware user groups.
- AppleCentres and Apple distributors throughout Australia.
- Software tutorials, for example, *HyperTutor* from Apple.

OPERATIONAL ASPECTS

Many hypertext applications can be purchased "off the shelf", ready to use (provided you have the necessary hardware); others are purchased as interfaces to online information services or databases on CD-ROM. Hypertext software can also be purchased for use in developing in-house applications (such as databases, "front ends" to other databases or CD-ROM, instructional packages). When purchased in this way, the software is sometimes known as an "authoring tool" or a "shell".

If a commitment has been made to develop a hypertext application in-house, careful planning is necessary to ensure the success of the project. The designer has to identify the audience, decide on the media formats to be used, locate the necessary hardware and software to support the media, and define the aims and objectives of the package. In addition, the information, in the selected formats, needs to be collected. Once this is done, then the information is entered into the system by whatever means necessary for each form of media - scanning for graphics and some text, sound digitising, keyboard entry, for instance. Then the pathways to link the information, and the best routes for cross-referencing, are decided and scripted.

Hardware Requirements

The hardware requirements can vary according to the hypermedia applications chosen. However, for most applications, a microcomputer and various peripherals will be needed as a minimum. In relation to microcomputers, the Apple Macintosh, the Commodore Amiga, and the BBC Archimedes all have graphics and sound capabilities which make them suitable for the handling of multimedia tasks. A high-resolution monitor, suitable for graphics display, is needed (usually with a special graphics display card in the computer as well). Peripherals needed may include a CD-ROM drive, a mouse, a monitor incorporating touch screen, speakers, a CD-ROM or videodisc player, and a modem.

In-house creation of hypertext/multimedia packages will require a scanner, to enable graphic and text information to be fed into the computer. There are two main types of optical scanners, flatbed and hand held. The flatbed is the more expensive; it can move automatically across an A4 page, reading in the information it contains. The hand held scanners have to be moved across the text or graphic image, and the results can depend on the steadiness of the user's hand movement; however, with experience, satisfactory results can be obtained. If information from external databases is to be used in the package, then a modem will be necessary. Other hardware required will depend on the media being used in the creation of the package (for example, an audio recorder/playback unit if sound is being used).

Software Requirements

To use an "off-the-shelf" commercial hypertext/multimedia application, only the access software is needed; this is usually, though not always, included with the package. However, to create an in-house application, the requirements are more complex. A range of software tools may be needed to produce a hypertext database, depending on the application. These tools may include the basic hypertext authoring tool (such as *HyperCard),* communications software, a graphics package to manipulate visual images (for example, *MacDraw, MacPaint),* a page layout package (such as *Pagemaker* or *Ready Set Go!),* a word processing package (such as Microsoft *Word* or *WordPerfect)* to create the text for the database; any external or source databases (such as a CD-ROM database); and a user-friendly interface manager (such as *GEM* or *OS2 Presentation Manager* for the IBM PC microcomputers). The software packages must be able to "talk" to each other to link and transport data.

SELECTION CRITERIA

There are two facets to the selection criteria for hypertext/hypermedia and multimedia: the selection of prepared commercial applications ready for use, and the selection of hypertext software for the development of in-house applications. In selecting prepared commercial applications, the normal selection criteria that are applied in the selection of other resources for the library should be applied to hypermedia packages, with the addition of special criteria related particularly to this technology. When a package is being developed in-house, the designer should use the normal selection criteria which would be applied in selecting any applications software for a particular task; in addition, there will be criteria which should be considered related particularly to hypertext and multimedia applications. In the design of the package, and the selection of media and information to be included, the designer should consider the needs of the users, the resources available, and the creativity, experience, and expertise of those likely to be involved in the development process. In relation to both, cost is likely to be an important factor as well, since prepared commercial packages, though decreasing in price, are not cheap, and the development process for in-house production of packages is likely to require considerable financial commitment.

In relation to prepared commercial or "off-the-shelf" hypertext/multimedia packages, the following are additional considerations:

- the availability of appropriate computer hardware, with the necessary amount of disk storage space on the computer, and any necessary peripherals (such as a CD-ROM player);
- the availability of the access software (if the access software is not sold as part of the package);
- the ease with which the application can be set up ready for use;
- whether or not the equipment has to be dedicated to that particular application;
- the users of the package, and their current level of technological and search expertise;
- "user-friendliness" and ease of searching;
- the ease with which users can create sequences and programmes of their own, using the application (if this is a consideration with the particular application).

In relation to hypertext software for use in developing in-house applications, the following are considerations:

- the availability of the necessary hardware, including computer hardware with appropriate disk storage capacity and graphics capability, media hardware, and peripherals such as scanners;
- the availability of any necessary support software;
- whether or not the software allows for the integration of the media selected for the application, and for interfacing with the necessary equipment and external sources or databases;
- likely hardware/software and development costs;

- the time and effort needed to develop the package;
- the skills and experience of the developers who will be using the software to develop the in-house application, and their ability to use the software or to acquire skills with it in a reasonable time;
- the ease with which the software can be used and the flexibility and power of the built-in programming language;
- support and documentation for developers/designers;
- the users for whom the in-house package is being developed, their needs and their current level of expertise;
- the advantages and limitations of hypermedia, as opposed to alternatives available;
- local conditions in the school, including the capability of the school to support the technology.

APPLICATIONS IN THE SCHOOL

The potential applications of these technologies in schools are endless. They allow educators to tailor information packages according to their aims and objectives and the needs of the learners. They give information seekers the opportunity to interact with an information source in a more flexible way, using styles of searching which suit them, and developing and modifying searches as they go along. A range of media can be incorporated into the learning experience, depending on the needs of the user/searcher. Reference tools such as dictionaries can be incorporated into the database, and used in various ways, as needed. The technologies also provide new ways for students to present assignments. A further application is related to archival material: visual images, text, video sequences, sound recordings, and documents, can be transferred to disk, so that the originals are preserved yet users have ready access to the copies on disk. The following are examples of hypermedia/hypertext projects which have applicability for schools.

- Project Emperor. This hypermedia application began as a research and development project; its purpose was to use the latest technology to present the findings of an important archaeological project in China. The end product was achieved through the use of many technologies, some new, some old, some still in the developmental stages. The first videodiscs from the project, titled *The First Emperor of China: Qin Shi Huang Di,* were produced in 1985. They incorporate text, graphics, sound, still and moving picture sequences, coupled with interactive courseware. The user can browse the information, select and delve deeper into particular aspects of interest, and select the level and the means by which information will be presented. For instance, the user can see the site of the archaeological dig, look at relics, zoom in to observe detail on particular relics, and rotate the image to view the relic from all sides. Explanations can be requested at a simple level or an expert level. Project Emperor is a large and important project which has been responsible for many interesting developments and technological achievements. It gives educators an illustration of the potential of hypermedia to offer new learning opportunities and enhanced information access.
- Marryatville Primary School. Multimedia projects do not necessarily have to be large-scale, high-tech applications. At Marryatville Primary School in Adelaide,

South Australia, Philip Callen's 1989 Year 5 class created multimedia projects using text, slides, and video. In language arts lessons, the class used their own narrative work to produce scripted storyboards, then worked in pairs to create images on a Commodore Amiga computer, using video stills and graphics/paint software. They played musical instruments to record any music needed. The finished products were of about three to five minutes in length; some were in slide show format, while others were based on an animation program. (Campbell, 1989)

- There have been examples of academic, public, and special libraries using in-house *HyperCard* stacks to provide library orientation guides for new users of the library, or instruction in library and resource use skills. For example, the Apple Library at Apple Computer in Cupertino, California, has made use of *HyperCard* on a network of Macintosh computers to help library users understand the services offered by the library. The user can "tour" the library, find out where the main service points are, and get information on those services. In addition, historical information about the company has been stored using *HyperCard*. At the University of Victoria (Canada) Library, a *HyperCard* stack has been designed to allow users easy access to information about materials in a special engineering collection, and to locate those materials within the library collection quickly. (Romaniuk, 1989) Similar applications would be possible in schools.

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CHAPTER SEVEN

CURRICULUM RESOURCES INFORMATION SYSTEMS: LIBRARY AUTOMATION

INTRODUCTION

The application of technology to curriculum resources information management through library automation provides a powerful tool for teacher librarians to respond to the challenges arising from self-determining schools. In addition to providing a teaching tool for the development of student information retrieval skills, the use of technology will facilitate effective management of all curriculum information resources in the school. Technology allows the management skills of the teacher librarian to be applied to resources housed outside the library building as well as inside it, and a comprehensive school database can be created. A network of terminals throughout the school, and possibly between schools, linked to a school curriculum resources information database, could be one of the aims of curriculum resources information systems.

Implementation of curriculum resources information systems can provide the catalyst for reconsidering the role of the teacher librarian and the function of the library resource centre in meeting the educational and information management needs of the school community.

OPERATIONAL ASPECTS

The three essential components of curriculum resources information systems are software, hardware, and data.

Software

Software is the critical component in the system and will determine the ability of the system to meet the requirements of the school. There are a large number of commercial programs available for school library automation, and schools writing their own program is neither necessary nor recommended. The software packages available vary a great deal in price and in the functions they perform; systems can be purchased that will meet almost any school need. At one end of the spectrum are systems offering circulation facilities for just one school; at the other end are integrated systems offering circulation, cataloguing, a public access catalogue (for searching by school staff and students), acquisitions, serials control, and stocktaking, for a number of branch libraries or libraries in a network.

Hardware

The hardware used will be largely dictated by the software. Most software will operate on a range of hardware platforms, but the options available to the school may be limited by the marketing strategies of the software suppliers, and by the school priorities. Items of hardware likely to be needed include the central processing unit (as a microcomputer, a minicomputer, or network manager), a storage unit (such as a hard disk), terminals or microcomputers, printer/s, modem, barcode readers or "light pens", power box, and backup hardware. The terminals or microcomputers in the management system can also

function to provide other services such as access to online information services, electronic mail, bulletin boards, CD-ROM, and hypermedia, if the appropriate hardware peripherals and software are added to them.

Data

A comprehensive school database should include records for all information resources available, including the pamphlet collections, videotapes, computer software, and charts. Quality data are essential to the system. "Garbage in, garbage out", the slogan for the 1989 Australian Library and Information Association Cataloguers Conference, must be heeded by schools. Considerable time and effort must be expended in planning before data are entered into the system. Software which provides for reference structures and complex file management will require additional professional input to ensure that the data are accessible to the users as needed.

Schools should consider applying a minimum of ASCIS cataloguing standards to all records to be entered into the database, so that consistent access points are available to users. ASCIS services such as ASCIS80 (for current cataloguing) and ASCISRECON (for retrospective cataloguing) are viable options for entering data into the school system in machine-readable form (via floppy disk or downloading). Outside of these services, manual entry of data at the keyboard by school staff, or by a bureau, is another option currently available to schools. In the future, CD-ROM versions of the ASCIS database, or direct downloading from the ASCIS database, may become available.

PLANNING

Library automation should be seen as a process which involves a number of stages; the neglect of any stage will hamper the effectiveness of the following stage, and, ultimately, the entire system. Working through a carefully-planned process will ensure that the full potential of the automated system is available in the school. The stages to be considered are:

- conduct of a feasibility study;
- development of an automation plan;
- selection of a system;
- implementation of a system;
- evaluation, maintenance, and enhancement of the system.

The first stage requires gaining a broad understanding of the benefits of automation to students, teachers, and the library, and the cost of achieving these benefits. These sets of information are the basis of decisions on the future of automation in the school. The feasibility study should explore the costs and benefits of the range of options available to the school. These could include:

- automating one function of the library, for example, overdues, or a subject guide to fiction, using a general purpose applications software package;
- automating specific functions of the library using a commercial library software package, for example, circulation;

- automating all library functions using an integrated commercial library software package;
- automating all records for curriculum resource collections in the school;
- automating in conjunction with other schools in the area using commercial library software packages capable of operating branch libraries or managing a network of libraries.

If the feasibility study reveals that the library should automate, then an automation plan should be developed which will provide a timeline for all of the activities required up to the final installation stage. Areas to be planned include:

- developing school community support;
- funding sources;
- library equipment and furniture;
- growth path for installing the automated system;
- preparation of catalogue records.

SOURCES OF INFORMATION

In acquiring information about systems and their potential for specific school situations, software suppliers can provide useful information. Demonstrations by vendors, discussions with users of the systems, and articles in the professional and trade journals and newsletters, are valuable sources irrespective of the system involved, since knowledge of what is available is essential to making informed decisions for the school.

Directories of school software are available, and journals such as *Emergency Librarian, Library Journal, Wilson Library Bulletin,* and *The Computing Teacher* have regular columns on library automation. Other journals, such as *Access, Australian Library Journal,* and *Orana* often have feature articles in this area.

Professional associations conduct seminars and demonstrations. Direct contact with colleagues who are users of automated systems is another valuable source of information. Most state education authorities have an automation officer or similar, who would be a useful first point of contact for government schools.

SELECTION CRITERIA

Selection of a specific system should take place only after a feasibility study has been completed and a comprehensive automation plan developed and supported by the school. This work will clarify the selection criteria which should be applied in selecting the system.

The ability of the software to meet the needs of the school is critical to the justification of automation. Consequently, it is obvious that system selection must be based on the software features. Other factors must also be considered, but these should be evaluated after the desirable software has been identified.

Selecting a library system based on the hardware available rather than the functions needed is an extremely dangerous practice. There is a risk of setting up a system which will not be adequate for the job, will not be viable in the long term, and may create more

problems than it solves.

A rigorous selection process is advocated which may require considerable time in its preparation and implementation. However, the costs of an inappropriate system will be far higher. A useful approach to the evaluation process is discussed by Kemeny (1988) in an article in the November issue of *Access*.

Selection criteria can be broadly divided into four areas: software; hardware; financial; and support.

Software

Aspects for consideration in relation to software include:

- cataloguing features
  - catalogue data input
  - catalogue maintenance
  - authority control
  - catalogue statistics;
- public access catalogue features
  - invoking searches
  - search fields
  - types of searches
  - display of search results;
- circulation features
  - loans
  - returns
  - location of an item
  - information on what a user has on loan
  - overdue notices
  - special loans
  - altering loan periods
  - maintenance;

- stocktaking features;
- branch library/networking features.

Hardware

The hardware for evaluation should be narrowed to that which will run the software which appears to meet the library's specifications. In selecting hardware, criteria include:

- storage capacity;
- processing power;
- ability to support the total software configuration the school requires;
- perfomance in the multi-user environment;
- communications capability;
- output forms, for example, online, print, floppy disk;
- ability to accept the needed peripheral devices, for example, barcode readers, floppy disk drives;
- methods of backup.

Support

Unfortunately, the importance of a high standard of support is often ignored during the evaluation process. In a dynamic system, support is essential, and aspects to consider include:

- the support firm
  - long-term viability of the firm
  - expertise of the personnel
  - comments from current users about the firm;
- installation costs;
- training costs and quality of the training offered;
- warranties for software and hardware;
- maintenance costs;
- software enhancements
  - frequency and nature of enhancements
  - policy on user input

costs

future directions;

- user groups.

Financial

The total costing of the complete configuration of the system should be considered. Some systems may have a lower initial start-up cost, but by the time all the equipment has been added to complete the system, the total cost can exceed that for systems which have a higher start-up cost. Costing for the curriculum resources information management system should include

- hardware

  central processor

  terminals/microcomputers

  multi-user/networking hardware

  barcode reader

  backup device

  power supply backup device

  modem

  printer;

- software

  applications software (the library/information management system software)

  operating system;

- installation

  software onto hardware

  hardware on the school site

  cabling

  power points

  cost involved in installing additional terminals at a later date;

- annual maintenance costs for software and hardware;

- consumables, for example, barcode labels, printer paper, backup tapes;

- o telephone line installation and rental;
- o data (costs for purchasing data from a service such as ASCIS, or for staff time spent on data input);
- o ergonomic furniture.

APPLICATIONS IN THE SCHOOL

The potential of curriculum resources information management systems to support both the educational and management roles of the teacher librarian has been recognised for some time.

Educational Outcomes

The educational benefits of automation are significant in economic and social terms, but not necessarily quantifiable. Access to an automated system would offer educational opportunities for students to develop information skills using a relevant database, the library catalogue. All students in all subject areas throughout the school will have opportunities to develop these skills through use of the library database within the learning context of the inquiry process.

Resource Access and Use

Automation increases the access to and use of curriculum information resources. Search strategies available on good automated systems should make it easier for students to identify the required resource, or a suitable resource, than searches on manual systems. In addition, the system should increase the access points for each resource, which will increase the likelihood that students will be able to identify appropriate resources. Entry of school-specific terms into the database would further enhance this.

Efficient circulation procedures available on automated systems will reduce the circulation turnaround time and therefore increase the availability of resources for use by other borrowers. The ease of student-administered loans and returns would also increase the availability of resources. Database reporting functions provided in the software should allow resource collections to be developed to meet school needs more accurately. Strengths and weaknesses in the collection should become apparent through collection use statistics. Usage statistics available from the system could be used as the basis for some performance indicators for the library.

Efficiency Outcomes

Efficiency outcomes available through automation focus on savings in clerical work time once the database has been completed. Areas of savings include:

- o processing of resources;
- o typing of catalogue cards;
- o filing of catalogue cards;
- o catalogue maintenance;
- o routine circulation procedures;
- o preparing overdue reports and notices;

- o conducting stocktakes.

There are also some areas of saving in professional staff time, for instance, in preparing bibliographies and selective dissemination of information (SDI) services, in locating suitable resources for classroom work, and in collecting information for and preparing management reports.

Curriculum Information Resources Management

Automation can be applied to all curriculum information resources in the school, and a comprehensive school database developed. Such a development would make more efficient use of teaching staff time which is currently used to maintain manually departmental resource collections throughout the school. The expertise of the teacher librarian in resource management would be used appropriately, and the technology would ensure that curriculum resources are managed efficiently and used throughout the school.

SELECTED READINGS

(1988), *Access,* (special issue on library automation), 2, 4, November, 1-47. (It should also be noted that the forthcoming November 1990 issue of *Access* will also be devoted to library automation.)

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CHAPTER EIGHT

NEW AND FORTHCOMING TECHNOLOGIES

INTRODUCTION

Machines that can learn; databases that talk to us; information systems that initiate searches or actions; "smart books"; the paperless office; even the "bookless library" - will these be part of our schools in the future? At the moment, the rate of change in the field of information technology is such that it is impossible to keep up-to-date with all developments that are likely to influence school libraries and information and resource services in schools. However, two things are clear: the school of the twenty-first century will have much more sophisticated information needs than the schools of today; and school libraries will need to develop and adopt new technologies in order to respond to those needs. In this chapter, some of the new and forthcoming technologies that are likely to have an impact on schools and school libraries will be discussed. However, there are two real risks involved in this kind of exercise. The first is that some of the technologies described will be adopted very quickly, and will be no longer "new or forthcoming" by the time this book is being read. The second is that some of the technologies will, in fact, never make it into commercial production, either because they do not prove to be effective, or because they are superseded even before they are fully developed.

There have been many recent developments in the computer industry which could ultimately have implications for school libraries and education. These would include research on superconductors; work on VLSI ("very large scale integration"), which is leading to faster and better computer chips; new storage media, like "digital paper", which appear to offer capacity and speed far above those of CD-ROMs; new programming techniques, including the development of "fifth generation languages"; and the introduction of OSI ("open systems interconnection"), which should result in better and easier computer communications. The areas which will be highlighted in this chapter, all areas in which a great deal of research and development is currently being done, are:

- The development of projects related to "artificial intelligence". This has the potential to change the way we construct and search library catalogues, and to revolutionise our ideas about information skills.
- The increasing miniaturisation of computer hardware.
- The development of the "smart book" (credit card sized units which plug into a book-sized, battery-operated reader) and similar "electronic books".

ARTIFICIAL INTELLIGENCE

Artificial intelligence research, including work in such areas as neural networks, heuristic programming, knowledge processing, and expert systems, is an area of enormous potential. It is also an area in which a great deal of work is being done, in Japan, Europe, the United States of America, and Australia (at places like the Australian Artificial Intelligence Institute in Melbourne). This research has many facets, involving

experts from a wide range of disciplines, including computer science, philosophy, psychology, biology, neurophysiology, genetics, linguistics, semiotics, hermeneutics, phenomenology, and the relatively new and eclectic field of cognitive science. An interesting result is that today, some of the most important research that is being done on learning theory is driven by artificial intelligence research (at places like MIT in Boston) rather than the other way around. The aim of most artificial intelligence research has been to produce computers, robots, and other artificial intelligence systems that are capable of emulating human thought processes, and of interacting with human users in human terms by conversing in "natural language". However, in looking at this work, it is important to realise that some writers have called into question the whole basis on which the search for a "computer that thinks like a human" rests, asking if it really is possible to develop computers that are the electronic equivalent of the human brain; if it really is possible for computers to "learn and create", in the sense in which those activities are generally understood.

What is the significance of this artificial intelligence work for teacher librarians? First, of course, greater knowledge and understanding of the learning process is important for all people involved in education. The research also sheds light on the nature of information skills, problem-solving skills, and teaching and learning processes, including what is known as "the inquiry process". But, at another level, artificial intelligence research has immediate and practical applications in, for instance, database construction techniques, online searching, and computer-based school library catalogues.

If the school library user could simply speak to an online catalogue, saying what he or she wanted, and have the computer respond with an appropriate screen display, this would make searching a catalogue a much simpler process. Further, if the catalogue could actually help the user by suggesting appropriate search strategies, or by formulating a search from requests from the user's unstructured input, then using a catalogue would be a very different process, and the teaching of information skills would be enhanced. Artificial intelligence interfaces, and particularly those incorporating voice recognition, will allow the user to interact with the computer in his or her own natural language, rather than by typing special commands. The user will not be forced to impose order and structure on his or her work before interacting with the computer system. In addition, catalogues will be both more helpful, perhaps in suggesting strategies to users, and also more "intuitive", allowing them to develop their searches in a natural way, even through browsing or "serendipity".

In relation to school library catalogues, there are at least two Australian research and development projects under way at the moment which may turn out to be significant. One of the developers of a commercially-available microcomputer-based school library catalogue system is working on an artificial intelligence interface which will allow for the acceptance of queries in the user's own natural language, and the formulation of search requests from this. The system will also be capable of "learning" through the results of successful search strategies, and then applying that learning in other searches. Three years is the development period currently being cited on this project before a prototype is available.

MINIATURE COMPUTERS

1989 saw the introduction onto the Australian market of a range of "miniature computers" - computers that are much smaller than the "desktop" microcomputers that have become the standard in schools, and smaller even that the "lap-top computers" and "luggable" microcomputers which had achieved some success in the business market in the previous two years. These miniature computers provide full computing power coupled with complete portability for a fraction of the price of a microcomputer. Given

the sophistication of the machines which have already appeared on the market, it is likely that these miniature computers will make a profound impact on educational, library, and personal computing over the next few years.

The Cambridge Computers Z88 was the first machine to make an impact in this field. Released in April 1988, it rapidly gained market acceptance. The size of an A4 sheet of paper, and less than three centimetres thick, it weighs only half a kilo - less than the average A4 sized book. It has 128K of RAM, expandable to 1.5 megabytes. Built-in software called *Pipedream* provides for word processing, spreadsheet, database, diary, calendar, and calculator. It will run on batteries or mains electricity; has a full-sized keyboard; can support a barcode reader or a modem; and can be linked to other computers, including computers running library systems. All this for a basic price of just under one thousand dollars Australian. With all these features, of course, the Z88 proved to be an instant marketing success, and will be only the forerunner of many similar machines.

But compact as they are, the Z88 and like machines are giants compared with the newer miniature computers, described by one manufacturer as "general purpose pocket terminals". Several pocket computers which appeared on the Australian market from May 1989 onwards are the size of a paperback book, and as light as a pocket calculator. One of the first was the Sharp IQ 7000, a battery-operated miniature computer with 32K of memory (with a 64K version promised). The IQ 7000 has a built-in scheduler, database, memo taker, calculator, calendar, all for less than four hundred dollars Australian. Credit card-sized slot-in application cards provide for a thesaurus/dictionary, a time/expense manager, and uploading of files to a PC. Other miniature computers to enter the market early in 1989 were the Casio SF-8000 Digital Diary, and the Psion (with 64K of memory, extendable to128K, a mains adaptor, an RS-232 interface to link with other computers and peripherals). The Atari Portfolio Pocket PC, released in September, had 128K of memory as standard (expandable to 640K), as much as many of the standard microcomputers then in use in schools. Inbuilt software included a word processor, a *Lotus 1-2-3* compatible spreadsheet, personal organiser, address and telephone number database, and communications software. A full RS-232 port will support a modem, direct links to another computer, or a barcode reader. All this for less than six hundred dollars. There are limitations, of course, particularly in the small keyboards that, of necessity, are part of these miniature computers.

However, despite the limitations, these miniature computers have many advantages, especially when used in conjunction with a larger microcomputer. Journalists have been using them to research and write stories in the field, and then send them to a computer in their office; survey-takers have been using them to collect data which is subsequently loaded into a larger system. Some libraries are already using them, with a barcode reader, to record loans in bookmobiles and in remote sites. It is likely that this represents only the beginnings of library use of these machines. A possibility would be students and teachers using them in the classroom to access the library system, and remote databases, and then to load the results into the word processor or database for further work, before printing out a project report on a standard printer linked via the RS-232 port.

The educational computing market is one into which the miniature computers are likely to move, simply because of their cost advantage. At the moment, one of the main limitations, in an educational context, is the lack of software. However, with good word processing and other applications software already available for many of the miniature computers, they would already meet some school needs. Another limitation, in the educational context, is likely to be teacher attitudes, particularly as the widespread use of these computers will pose the same sort of challenge to the general classroom teacher that cheap pocket calculators presented to mathematics teachers when they first became

available. Yet the day when we see a computer on every child's desk may not be that far off - though the computer will probably look a little different to the sort of machine we had envisaged a few years ago.

THE "SMART BOOK"

The "smart book" was an Australian invention, though research and development teams in other countries have been working on similar projects. It grew out of an idea of the State Director of the Bible Society in Australia (New South Wales) for harnessing modern technology to produce a cheaper Bible. The concept that emerged was of a portable screen/reader, with a "book" on a credit card-sized module (a "smart card") which could be inserted into the reader by the user. Technological problems which had to be overcome in developing the project included the limitations of LCD computer screen technology, and the difficulties in compressing the text of a book the size of the Bible onto one card.

In a presentation on the "smart book" at the Information Online 88 Conference in Sydney in January 1988, Katie Blake described it as "a kind of half way step between the printed book and a microcomputer", and went on to discuss the concept in more detail:

> "The reader is a bit like one of those handheld video games, with a page-sized screen set into a reader about the size of a standard book (smaller and lighter than the phone book, larger than a paperback). It has six buttons to control the functions - to navigate the cursor around the screen. It runs off mains power, or from batteries for complete portability. The screen is backlit so you can read it anywhere, even in total darkness. The books are on credit card sized modules which are simply plugged into the reader. These Smart Cards store the compressed information on a magnetic strip in exactly the same way as for our credit cards. They are small, easy to store, last longer than conventional paper books, and are much easier to handle than microfiche. They allow functions impossible in traditional books. Mathematical functions can be built into a textbook or tax guide, text is fully and rapidly searchable. No index is required, the Smart Book provides access to the whole work ... think of interactive fiction, or textbooks with self-marking exercises. You can have variable type size, replacing large print editions, or a voice synthesizer might read the book to you, in your choice of language." (p.3)

Katie Blake goes on to suggest some of the changes we are likely to see in publishing and libraries as a result of developments such as the "smart book"; certainly, it will influence our ideas about just what a book is and how we relate to it. With interactive fiction and "personalised books", the whole relationship between author and reader will undergo a change; in looking at fiction in these formats, our view of the author as the main creator of the book will be challenged. Non-fiction books will be used in different ways, since the search and browse functions of the "smart book" will provide the reader with forms of access that are not possible in printed books. If someone cannot read, they will be able to choose to have the "smart book" read to them. But while Blake does not see the "smart book" replacing the traditional book in the short term (she predicts a long period during which they will stand side by side as alternatives), she does feel that, ultimately, various forms of electronic publishing will "oust traditional publishing". (p.6)

Her view of the bookshop of the future reflects the advantages she sees in developments such as the "smart book". Book publishers have always faced the problem of how many copies of a book to print, while bookshops have faced the problem of how many copies of a book they are likely to sell. Blake sees the solution to these problems in bookshops that are "Handybanks for Books", where the encoded and compressed text is loaded onto the "smart card" by a computerised vending machine at point of sale:

> "This could be achieved with book reviews and catalogues on optical disc, allowing you to browse through titles by author, subject area, or even randomly. Once a selection is made, you insert your credit card or bank card, the book is programmed [onto a card] on the spot and out it pops from a slot. No more remainders, the number of books printed is exactly the same as the number of books sold." (p.5)

Needless to say, she sees these developments as having a similar impact on libraries and information services. School libraries will not be able to isolate themselves from such trends. Apart from physical changes in the library environment and in the library collections that might result, there will be implications for information skills instruction.

CONCLUSION

Speculation about "the book of the future", "the school of the future", and "the library of the future" has occupied many people in our profession at various times. While some of the results are frivolous, such speculation does help us to appreciate the fact that the future will be very different from the past, and to begin to plan for the future. While "the paperless classroom" and "the bookless school library" may not be just around the corner - or even viable concepts - we are already approaching the stage where it will be possible for students and teachers to have access, from their desks, to information held in the school library, elsewhere in the school, and outside the school. Access to information will become more critical in education and in the management of education. The need for appropriate information skills will become even more apparent; while developments like artificial intelligence interfaces and the "smart book" will make it easier for people to gain access to information, they will not help those people to use the information effectively. In the meantime, even newer technologies are already on the horizon, technologies which have the potential to change our ideas and refocus our vision in much the same way as computers and telecommunications technologies have done over the last ten years.

SELECTED READINGS

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CHAPTER NINE

AN IT PLAN FOR THE SCHOOL LIBRARY

Applications of information technology in the school library can be confusing amd costly. To minimise the confusion and promote effective expenditure on information technology, it will be necessary for teacher librarians to familiarise themselves with the technology and analyse the implications for their school. This should be done in conjunction with the whole school looking at information technology applications. It is recommended that the long-term scenario for applications of technology in the school should be developed and the applications to curriculum resource information should be included within the plan. The benefits of developing the plan include:

- o establishing a clear picture of the information technology applications required to meet the specific needs of the school;
- o giving an opportunity for the school community to be involved and thereby support the plan;
- o identifying the financial and human resources available;
- o making purchases consistent with the total school needs. This avoids purchases that:

  are not functional to meet school needs

  are not compatible

  duplicate functions

  become obsolete as the school moves to another phase of development;
- o clearly identifying stages so that work can proceed to the completion of the total scenario.

The resulting IT plan should cover at least a three-year period, with provision for flexibility as new technologies and school needs emerge.

Information technology applications with particular implications for the school library which could be considered in the school IT plan include:

- o online information services;
- o electronic bulletin boards and electronic mail;
- o the facility to use optical disk media;
- o the facility to use hypermedia, either alone or in conjunction with other media;

- automation of school curriculum information resources systems;
- computer-based curriculum resources in the school.

It is important that these library aspects should be included in the total school plan to ensure the planning benefits previously identified. For the library, this will have the added bonus of providing school support for technological developments in the library, and clarification of the information management role function of the library.

STRATEGY FOR DEVELOPING AN IT PLAN

The first step in developing a school IT plan is for the school to accept the need for the plan. Effective lobbying could achieve this. A working party of stakeholders in the school and people with expertise could be a means for the development of the plan. Chances of success in the implementation stage will be increased if the school community is involved in the planning and decision-making process; this involvement and interaction will need to be planned for.

Planning could commence by identifying the information technology applications which meet the needs of the school.

- What are the school's curriculum resources information management needs?
- What information technology applications are available or being developed?
- What applications can be used to meet the identified school needs?
- What are the relationships between these applications? This can be considered in terms of both the hardware needed for the system and the nature of the access required, for example, a PC based system, student access in the library, staff access throughout the school.
- What are the different methods of implementing these applications in the school?
- What is the most effective way of implementing these applications in the school?

It is likely that there are various paths to achieving the final scenario for the school. These should be identified, explored, and the most feasible selected. A timeline could now be prepared which identifies the stages involved in reaching the final configuration. Aspects that could be included in the timeline include:

- the nature of the tasks to be conducted by school staff during each stage of the plan. This may include data preparation time, training, teaching students, establishing policies, preparing documentation, liaising with support groups, investigating options, lobbying;
- information technology purchases. Specify the hardware and software components to be purchased at each stage. For example, personal computer and CD-ROM drive;

- other equipment purchases. Specify equipment other than IT which will need to be provided by the school: power points, computer cabling, ergonomic work areas, are obvious examples;

- the cost of each stage in the process. As funds become available, it will be clear what the next priority is and the cost of achieving it. The success of the plan will be further guaranteed if funding commitments are received from each funding source;

- specifying school outcomes available to the school community at each stage. For example, students have access to online databases.

SAMPLE LIBRARY IT PLAN

It is important that schools select applications relevant to the school's needs and resources. The plan illustrated here makes extensive use of information technology which may be appropriate for a large secondary school. The plan is the library section of a total school IT plan.

Prior to developing the timeline, the school selected the information technology applications considered to be appropriate responsibilities of the library. The relationship between the components within the library and with others in the school was then examined. The outcomes of these decisions were to:

- develop a total school network based on the existing administration system, with terminals located throughout the school, all connected to the same central processor/s;

- automate all curriculum resource collections in the school using a curriculum resources information system administered by the library and networked throughout the school;

- provide student access to online databases, CD-ROM, DVI, and educational software, using hardware and software stored in the library. These machines should be capable of providing access to the curriculum resources information system (the library automation system);

- operate electronic mail and bulletin boards based on the networked system throughout the school;

- provide dial-up access to the school curriculum resources database, the CD-ROM systems, and electronic communications system, to students and teachers at home.

SELECTED READINGS

(1989), Lobbying for change, *ASLA Occasional Paper 1*, Australian School Library Association, Melbourne.

SAMPLE LIBRARY IT PLAN

YEAR	ACTIVITY	IT EQUIPMENT	OTHER EQUIPMENT	FUNDING			SCHOOL OUTCOME
				INCOME	EXPENSES	BALANCE	
1	o weed & stocktake all collections o order library catalogue records in machine readable form o integrate computing software into the library o teach staff & students use of online, CD ROM & educational software	o 2 personal computers o CD-ROM drive o modem o communications software o CD-ROM software o educational software	o direct telephone line to library o power points installed o computer cabling installed in library	o accumulated library savings $10 000 o school $10 000 o parents $ 5 000 o library $ 4 000	$10 000	$19 000	o online database access o CD-ROM system o external electronic mail & bulletin boards available o educational software available to students
2	o load library database o teach staff & students use of library system o establish district policy on dial-up access o enter subject reference	o automated catalogue & search system	o modify library workroom bench space o ergonomic chair for workroom terminal o computer cabling throughout the school	o yr 1 balance $19 000 o school $ 5 000 o parents $ 5 000 o library $ 4 000	$30 000	$ 3 000	o automated library curriculum resources catalogue o automated student access
3	o enter data of other curriculum resource collections in the school o barcode all circulation resources in the school o enter student data	o automated circulation system	o VDU arm for circulation monitor o computer desks for faculty areas	o yr 2 balance $ 3 000 o school $ 5 000 o parents $ 5 000 o library $ 4 000 o faculties $ 5 000	$20 000	$ 2 000	o automated system for all curriculum resources in the school
4	o policy established on electronic communications in the school o teach staff & students use of electronic communications	o electronic mail & bulletin board software		o yr 3 balance $ 2 000 o school $ 2 000	$ 1 000	$ 3 000	o electronic communications throughout the school
5	o teach staff & students use of hypermedia	o CD-I or CD-ROM XA or DVI hardware o appropriate software		o yr 4 balance $ 3 000 o school $ 2 000 o library $ 2 000	$ 5 000	$ 2 000	o hypermedia educational opportunities

APPENDICES

APPENDIX ONE

DIRECTORY OF SOURCES AND SERVICES

This "directory of sources and services" provides contact and other information related to resources, programs, online information services, electronic bulletin boards, CD-ROM, and other media described in this book. For easy reference, it is arranged in the same sequence as the chapters of the book.

ONLINE INFORMATION SERVICES

Online Information Services or "Hosts"

ABN (Australian Bibliographic Network)
Contact the ABN Office, National Library of Australia, Canberra, Australian Capital Territory 2600.

ASCIS (a programme of the Curriculum Corporation)
Contact the Curriculum Corporation, PO Box 177, Carlton South, Victoria 3053, or by telephone to the Curriculum Corporation on (03) 882 8108.

AUSINET
Contact Ferntree Computer Corporation, 310 Ferntree Gully Road, Clayton, Victoria 3168.

AUSTRALIS
Contact CSIRO, 314 Albert Street, East Melbourne, Victoria 3002, or CSIRO AUSTRALIS, PO Box 89, East Melbourne, Victoria 3002.

DATA*STAR
Contact DS Marketing Limited, Plaza Suite, 114 Jermyn Street, London, SW1X 6MJ, England, or, for Australian DATA*STAR information/training, contact Scansearch, 31 Flemington Street, Frewville, South Australia 5063.

DIALOG
Contact DIALOG Information Services, 3460 Hillview Avenue, Palo Alto, California 94304, United States of America. For information on the DIALOG Classroom Instruction Program, contact The Administrator, Classroom Instruction Program, DIALOG Information Services, 1901 North Moore Street, Suite 809, Arlington, Virginia 22209, United States of America. The Australian contact is Insearch Limited/DIALOG, PO Box K16, Haymarket, New South Wales 2000.

Discovery
Contact Telecom Discovery, 181 Victoria Parade, Collingwood, Victoria 3066.

Elderlink
Contact Elders Videotex, Elders Pastoral, 27 Currie Street, Adelaide, South Australia 5000.

ORBIT
The Australian contact is ORBIT Search Service, PO Box 544, Potts Point, New South Wales 2011; the telephone number is (02) 360 2691.

Individual Databases

Academic American Encyclopedia
Available online on DIALOG.

Australian Associated Press
Available through Australian Associated Press itself, or, for schools in South Australia through NEXUS and for schools in Tasmania on TASNET.

Australian Bibliography of Agriculture
Available online on AUSTRALIS.

Australian Bureau of Statistics
Available online on *Discovery*.

Australian Education Index
Available online on AUSINET.

Australian Family and Society Abstracts
Available online on AUSTRALIS.

Australian Financial Review
Available online on AUSINET.

Australian Public Affairs Information Service (APAIS)
Available online on AUSINET.

ERIC
Available online on both DIALOG and ORBIT.

Everyman's Encyclopedia
Available online on DIALOG.

Facts on File
Available online on DIALOG.

Heritage Australia
Available online on AUSTRALIS.

Leisure
Available online on AUSTRALIS.

PressCom
Contact PressCom, Advertiser Newspapers Limited, 121 King William Street, Adelaide, South Australia 5000, or GPO Box 339, Adelaide, South Australia 5001.

SAGE
Available online on AUSTRALIS.

Telecommunications Services

AUSTPAC
Contact the Telecom Australia office in your own capital city; in Western Australia, the address is AUSTPAC, Telecom Australia, 80 Stirling Street, Perth, Western Australia 6000.

OTC Dialcom
Contact the Overseas Telecommunications Commission address in your own capital city; in Perth, the address is 22 St Georges Terrace, Perth, Western Australia 6000.

ELECTRONIC BULLETIN BOARDS AND ELECTRONIC MAIL

Electronic Bulletin Boards

LIB-LINK
The contact person and "sysop" is Ms Margaret McLaren, Statewide School Library Support Centre (Victorian Ministry of Education), Ground Floor, Rear Building, 67 High Street, Prahran, Victoria 3181; telephone (03) 521 1721.

NEXUS
The contact person for NEXUS is Henry Legedza, Angle Park Computing Centre, South Australian Department of Education, Cowan Street, Angle Park, South Australia 5010; telephone (08) 243 5541.

Electronic Mail Services

ASCIS (a programme of the Curriculum Corporation)
Contact the Curriculum Corporation, PO Box 177, Carlton South, Victoria 3053; telephone (03) 882 8108.

Keylink
For information, contact the Telecom Australia office in your own capital city, or telephone Telecom Australia's Keylink enquiry number, 008 023 223.

Projects and Resources

Computer Pals Across the World
The Director of the Computer Pals Across the World Project is Mr Malcolm Beazley, PO Box 280, Manly, New South Wales 2095. He can supply detailed information and arrange membership for schools.

Riverina Region, New South Wales Department of Education, Publications
For information and copies of curriculum unit booklets, contact Riverina Resource and Information Technology Centre, PO Box 478, Wagga Wagga, New South Wales 2650.

OPTICAL DISK MEDIA

CD-ROM

Most CD-ROMs are now available, in the main cities at least, from firms selling CD-ROM players or computer software. Consequently, you should try local firms first, particularly for popular discs like *The Electronic Encyclopedia, The Bible, The World Factbook, The Oxford English Dictionary, The McGraw-Hill Science and Technology Encyclopedia,* or *Microsoft Bookshelf.*

Books in Print
Available from D.W. Thorpe, 20-40 Stokes Street, Port Melbourne, Victoria 3207; telephone (03) 645 1511.

Bowkers Reviews Plus
Available from D.W. Thorpe, 20-40 Stokes Street, Port Melbourne, Victoria 3207; telephone (03) 645 1511.

British Books in Print
Available from D.W. Thorpe, 20-40 Stokes Street, Port Melbourne, Victoria 3207; telephone (03) 645 1511.

CDATA86
Available from Space Time Research Pty Limited, 668 Burwood Road, Hawthorn East, Victoria 3123; telephone (03) 813 3211.

ERIC
The Silverplatter version is available from ALDIS, 275 Normanby Road, Port Melbourne, Victoria 3207; telephone (03) 647 9724. The DIALOG version is available from DIALOG Information Services, 3460 Hillview Avenue, Palo Alto, California 94304, United States of America.

Facts on File News Digest
Contact Facts on File, 460 Park Avenue South, New York, New York 1006, United States of America.

Grolier's Electronic Encyclopedia
Available from Grolier Encyclopedia, 14 Mars Road, Lane Cove, New South Wales 2066, or from your local Grolier representative.

Magazine Article Summaries
Available from Magazine Article Summaries, PO Box 325, Topsfield, Massachusetts, 01983, United States of America.

McGraw-Hill Science and Technology Encyclopedia
Contact McGraw-Hill Book Company, 11 West 19th Street, New York, New York 10011, United States of America. Also available from computer software suppliers and CD-ROM hardware suppliers in Australia.

Medline
The Silverplatter version is available from ALDIS, 275 Normanby Road, Port Melbourne, Victoria 3207; telephone (03) 647 9724.

Science Helper K-8
Contact PC-SIG Incorporated, 1030D East Duane Avenue, Sunnyville, California 94086, United States of America.

Wilsondisc
Contact Wilsondisc, The H.W. Wilson Company, 950 University Avenue, Bronx, New York, 10452, United States of America.

Videodiscs

Ask the Workers
Contact the producers, West Ed Media, 296 Vincent Street, Leederville, Western Australia 6007.

Aussie Barbie
Contact Adelaide College of TAFE, 20 Light Square, Adelaide, South Australia 5000; telephone (08) 213 0235.

BBC Domesday Disks
Contact the Australian agents, Barson Computers, Unit 7, 190 George Street, Parramatta, New South Wales 2150; telephone (02) 891 6555.

Granite State Sampler
For information, contact Serec Incorporated, Derry, New Hampshire, United States of America.

HYPERTEXT AND HYPERMEDIA

ArchiText
Contact Prainpower Incorporated, 24009 Ventura Boulevard, Suite 250, Calabasas, California 91302, United States of America; telephone (800) 345 0519.

Business Filevision
Contact Marvelin Corporation, 3420 Ocean Park Boulevard, Suite 3020, Santa Monica, California 90405, United States of America; telephone (213) 450 6813.

The Dinosaur Hypercard
Available from Merhilt's Kookaburra Software, PO Box 126, Wentworthville, New South Wales 2145. Telephone (02) 635 7841.

The First Fleet
Available from Merhilt's Kookaburra Software, PO Box 126, Wentworthville, New South Wales 2145. Telephone (02) 635 7841.

Guide
Contact OWL International Incorporated, 14218 NE 21st Street, Bellevue, Washington 98007, United States of America; telephone (206) 747 3203.

HyperCard
Available "bundled" with every Apple Macintosh computer sold.

Linkway
Contact Hypertech Pty Limited, 408 Victoria Road, Gladesville, New South Wales 2111; telephone (02) 816 1211.

APPENDIX TWO

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Note that further references can be found within each chapter, under the heading, "Further Reading". Items listed within the chapters are not listed again in this Bibliography.

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APPENDIX THREE

PLANNING CONSIDERATIONS

Note that this Appendix is reproduced from the 1987 report of the School Libraries Section (WA Group), *Online Information Services for Schools: Implications for School Libraries*. It is included in this new publication because so many people indicated that they found it to be very useful in preparing and planning for the introduction of online information services in a school library. Much of the information would also apply to the introduction of electronic bulletin boards and electronic mail, CD-ROM, hypermedia, and other forms of information technology.

INTRODUCTION

In planning for the introduction of online services into the school, many factors need to be taken into consideration if these services are to be used effectively. First, of course, should be the needs of the users, and the educational aims of the school. The teacher librarian will also need to look at the constraints imposed by space in the library, existing furniture and equipment, staff time available, and financial considerations, and to plan for any necessary changes in these areas. Even before equipment is purchased and other management decisions are made, a systematic plan for the implementation of an online search service in the school should be developed, preferably with input from all likely user groups.

PLANNING CONSIDERATIONS

Physical Facilities

Space Available. Space will be needed for the microcomputer or terminal, screen, printer, desk, and chair, with sufficient room for a user to work comfortably. The equipment will need to be located near a power source and a telephone. If it is planned to have groups of students taking part in the search process or receiving instruction in online searching, then the equipment should be placed in an area where there is adequate seating for groups and where the library's traffic flow pattern is not interrupted.

Furniture. Some new furniture may be necessary, or an adaptation of existing furniture, so that the online searcher has adequate desk space and appropriate seating. Ideally, the microcomputer, with keyboard, VDU, and printer, should be placed on a desk which also has sufficient space for a search manual and notes. The searcher will need a chair which is adjusted so that the keyboard is within easy reach and the screen is clearly visible. Any necessary re-arrangement of existing furniture, to allow for the use of online services, should also be taken into consideration. It may also be necessary to provide special lighting in the online searching area, or to modify existing lighting so that reflections on the VDU screen are reduced.

If you are buying new furniture to accommodate online searching, ergonomic considerations should be taken into account in the selection. If the microcomputer is to be used for other tasks in addition to online searching, and particularly if it is to be used for applications like word processing, where the user spends a lot of time on the computer, then ergonomic considerations become more important.

Equipment. There are many equipment options available for online searching. Basically, what is needed is a microcomputer, a telephone, communications software, and a modem (to link the telephone to the computer). However, a "dedicated terminal" (a computer designed for just this one purpose) can also be used, and there are other possibilities as well. Choice of equipment for online searching will depend on equipment already available in the school and what the school can afford.

Electrical Wiring and Telephone Connections. Access to both an electricity supply and a telephone outlet is necessary. While it is more convenient to have a direct outside telephone line for online searching, it is possible to go through a switchboard if an outside line is not available. The main disadvantage of this is that a telephone line through the switchboard is likely to be tied up for considerable periods when searches are being done.

Environmental Considerations. You will need to guard against damage to the computer and its disks from excessive heat, dust (including chalk dust), static electricity, and power fluctuations. While an air conditioned room is not necessary, the computer should be in a well-ventilated area, away from direct sunlight, and not next to the heater or the boiler room! If the computer is in an area used for class groups, replace any chalkboards with whiteboards. If your room has a nylon carpet which could cause a build-up of static electricity, place both the online searcher's desk and the chair on a rubber mat. In areas where power fluctuations are a problem, you should consider purchasing a voltage regulator. These come in different grades and your choice will depend on the severity of the power fluctuations you usually experience.

Library Staff

Existing library staffing, and the allocation of tasks amongst staff, should be considered in the light of the new services to be offered. The following factors should be taken into account:

- professional, paraprofessional, and non-professional staff available - do you have sufficient staff, at appropriate levels;
- the level of computer literacy and experience of staff, their attitudes towards the project, and their preparedness to gain any additional expertise necessary;
- any necessary staff development and training, and the availability of resources for this;
- the level of technical support available locally, including support available from the hardware supplier, the software vendor, and consultants or experts (even parents with expertise).

Where there is a high level of local support, the expertise of the library staff will be less critical.

Budget

There will be a need to re-assess the library budget priorities in terms of the new needs generated by the introduction of online services. This may not necessarily mean an increased budget, though it will certainly mean new ways of using the budget. Two budget elements need to be taken into account in looking at funding for online services: the start-up or establishment costs, which are normally once-only items; and the ongoing costs of providing the service.

Initial Costs. These will include equipment such as the microcomputer and modem, communications software, furniture, and initial staff training.

Ongoing Costs. Funds should be allocated on an annual basis to cover telecommunications charges, subscriptions to online services, computer paper, and equipment maintenance/repairs.

Implications for Collection Development Policy

The introduction of online services may have implications for the library's collection development policy, and for the way in which money is allocated for library purchases. The following are examples of ways in which the collection development policy might be affected.

- Instead of purchasing multiple copies of encyclopaedias, the library may allocate part of its budget to the provision of online access to *The Australian Encyclopaedia* or *The Academic American Encyclopaedia* (or, alternatively, might allocate funds to the provision of the Grolier *Electronic Encyclopedia*, the CD-ROM version of *The Academic American Encyclopedia*, thus providing a different form of access for students).

- In curriculum areas such as science or civics, where access to up-to-date information is critical, a decision may be taken to spend money on online access to current information rather than on building up a book collection in these areas which is out of date even before purchase.

Criteria for Selecting Online Information Services

In selecting online resources, the same criteria should be applied as would be applied in selecting any resources to support the school curriculum. In addition, some special criteria may apply; these could include the following:

- recency and accuracy of the information on the service, and evidence of any bias in treatment or in selection of material for inclusion (for instance, the presentation of the national viewpoint of one country, the use of terminology that does not have universal applicability);

- the ease of use and user friendliness of the service (the quality of the manuals, the provision of on-screen help, clearly-worded screen instructions, simple and easy-to-remember procedures);

- whether or not it is necessary to attend a special course before the service can be used properly;

- the overall cost, including subscription, telecommunications charges, and any costs for time on the system;

- the availability of special rates for schools.

Promotion of the Services

Promotion of online information sources and services to potential users needs to be undertaken on a systematic basis if a high rate od usage is to be achieved in the school. In promoting the service, stress should be placed on the benefits to the user of such services, and demonstrations are one of the most effective ways of doing this. Possible avenues of promotion include:

- displays, both inside the library and outside (staff rooms, classrooms);
- addressing staff meetings and demonstrating the system/s;
- working co-operatively with teachers on curriculum units which incorporate the use of online resources;
- library newsletters;
- posters in locations outside the library.

User Education

Once the school community has been made aware of the availability of online information services, and the advantages they offer, user education is necessary to ensure that the best possible use is made of these resources. As with promotion, user education, for both staff and students, needs to be undertaken on a planned basis, with due consideration given to the needs of each group of users. Ideally, user education should be undertaken at the point of need, and, for students, within the context of the curriculum.

Convincing the Principal and/or Preparing a Submission

Providing online services in a school library involves a significant investment in terms of time and money. The people who make the decisions about how money should be spent and how things will be done need to know that the proposed services are worthwhile. Any argument or submission for the introduction of online services in the school setting should, therefore, include an educational rationale, a statement of the direct benefits for the school and the educational programme, and an analysis of the costs involved (both setting up and ongoing costs). The following steps should be taken in preparing a case.

- A situation analysis, covering, among other things, the school and its aims; the information needs of the school community in relation to the curriculum, recreation, cultural life, and daily activities; the age, ability level, and other characteristics of the information users in the school; other sources of information available in the school and the community to meet user needs.
- An analysis of the aims and objectives of the proposed online service and its relationship to demonstrated needs.
- An investigation of both the information services available, and the equipment, that would appear to meet the school needs. This could involve the use of directories (see the Bibliography in Appendix Two for some of these), visits to computer exhibitions, visits to other libraries where online services are being used.
- Identifying manufacturers and suppliers of hardware, and contacting them for demonstrations; arranging to attend demonstrations of online services where possible.

- Seeking technical advice from experts, reading reviews in computer journals.
- Identifying potential costs and relating them to perceived benefits.